Results of forest insect and disease surveys in the NORTHEASTERN REGION of Ontario, 1990

CARRIED OUT BY THE GREAT LAKES FORESTRY CENTRE IN COOPERATION WITH THE ONTARIO MINISTRY OF NATURAL RESOURCES

D.C Constable, T. Bouwmeester, W.A. Ingram and S. Melbourne

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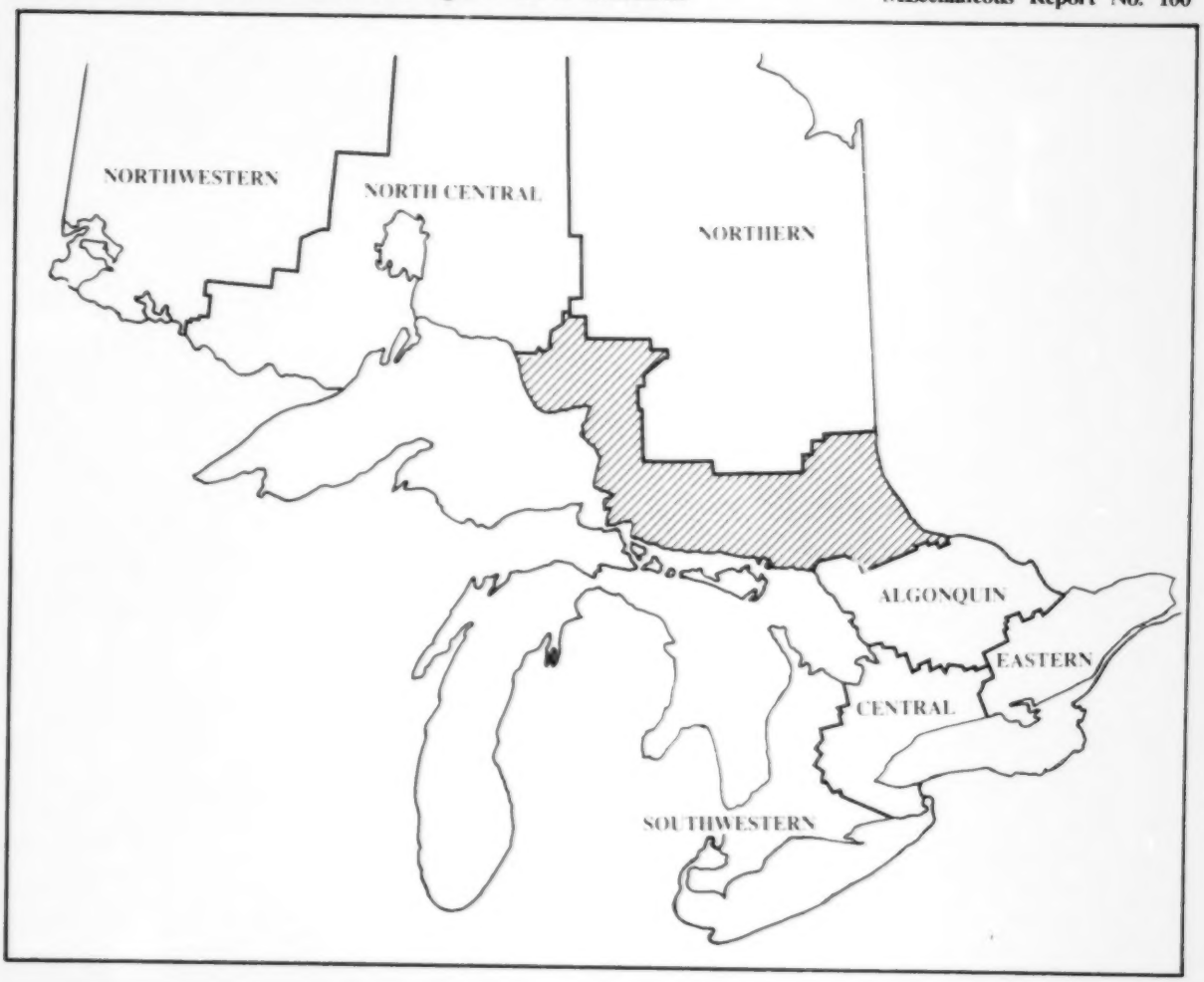

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Ontario Region is one of six regional establishments located across Canada and operated by Forestry Canada. The overall objective of Forestry Canada is to promote the preservation, enhancement and wise use of a healthy, attractive and bountiful forest resource and terrestrial environment for the economic and social benefit of all Canadians. Ontario Region pursues this objective by conducting two major programs: research and technical services and forestry development. Both programs address major problems affecting forest management and the forest environment primarily in Ontario, but because of the transprovincial nature of the forest resource, many elements of our research program are of national significance.

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Major activities in forestry development include federal management responsibility for federal-provincial forest management agreements, participation in the National Forestry Statistics program and forest economics research.

Close working relationships are maintained with the Ontario Ministry of Natural Resources, the forest industry, educational institutions specializing in forestry and the biological sciences, and other forestry organizations within the province. Ontario Region is represented on the Ontario Forestry Council and the Ontario Forestry Research Committee, which have responsibility for coordinating forestry research in Ontario.

It is recognized that forested land must be managed in the best public interest, not only for the wood production essential to our economy, but also for the recreational purposes that are so important to our social well-being. This must be achieved in a manner that will maintain or improve the quality of the forest environment and preserve it for generations to come.

RESULTS OF FOREST INSECT AND DISEASE SURVEYS IN THE NORTHEASTERN REGION OF ONTARIO

1990

(FOREST DISTRICTS: WAWA, SAULT STE. MARIE, BLIND RIVER ESPANOLA, SUDBURY, TEMAGAMI AND NORTH BAY)

D.C. Constable, T. Bouwmeester, W.A. Ingram and S. Melbourne

FORESTRY CANADA

ONTARIO REGION

GREAT LAKES FORESTRY CENTRE

1991

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SURVEY HIGHLIGHTS

This report describes the status of the more important insect and disease conditions that affected the forests in the Northeastern Region of Ontario in 1990, as determined from ground and aerial surveys.

Forest tent caterpillar defoliation decreased by 600,719 ha across the Region, with the most noticeable reductions occurring in the North Bay and Temagami districts. For the first time, gypsy moth larvae were found at several locations on Manitoulin Island, Espanola District, with the largest number of larvae near the town of Wikwemikong. Egg masses were also found in the above area and in the Sault Ste. Marie and Sudbury districts. No infestations or defoliation by the spruce budworm occurred; however, trace levels of the jack pine budworm were observed in Merritt Township, Espanola District. Spruce budworm egg-mass sampling conducted at 27 locations indicated that light, light-to-moderate and moderate infestations could occur in four districts in 1991 and light defoliation by the jack pine budworm is forecast for one area in Espanola District.

Approximately 15,595 ha of maple deterioration (bare tops) occurred in several townships of Sault Ste. Marie District. In an area of approximately 222,650 ha in Wawa District, early snow in November 1989 caused much damage to and breakage of tree tops. Leaf scorch was also prevalent at points in the Blind River and Sault Ste. Marie districts.

The 25-tree sugar maple plots, the North American Maple Project plots, a birch plot and the Acid Rain National Early Warning System (ARNEWS) plots were all revisited. The Thessalon Tree Nursery was visited again, but no major insect or disease problems were observed.

One staff change also occurred in Northeastern Region in 1990. Mr. Wayne Ingram was promoted to Regional Supervisor for the Northern Region and was replaced by Mr. Tim Bouwmeester, Ranger-In-Training.

In this report, the following categories are used to describe the importance of insects or diseases:

Major Insect/Disease

capable of causing serious injury to or death of living trees or shrubs

Minor Insects/Diseases

capable of causing sporadic or localized injury but not usually a serious threat to living trees or shrubs

Other Forest Insects/Diseases (Tables)

These tables provide information on two types of pest:

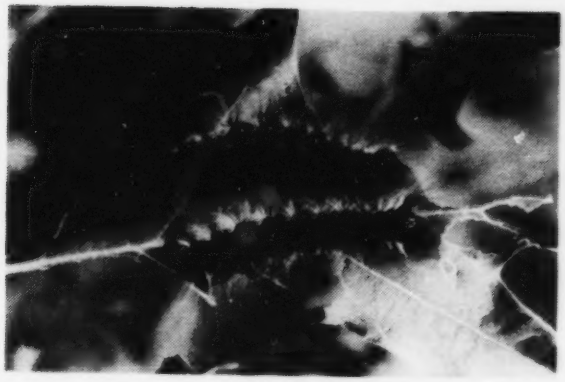
(1) those that are of minor importance and that have not been known to cause serious damage to forest trees;
(2) those that are capable of causing serious damage but, because of low incidence or for other reasons, did not cause serious damage in 1990

Districts affected by specific insects or diseases are listed beneath the names of those insects or diseases in the table of contents.

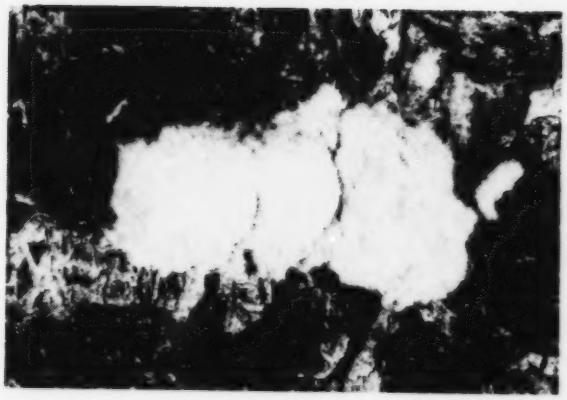
The authors express their appreciation to personnel of the Ontario Ministry of Natural Resources (OMNR) and various wood-using industries for their cooperation during the 1990 field season.

D.C. Constable
T. Bouwmeester
W.A. Ingram
S. Melbourne

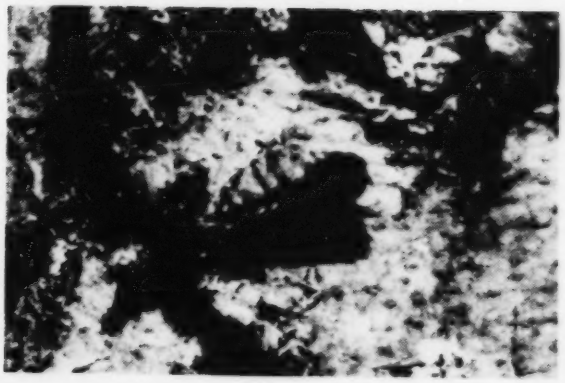
FRONTISPIECE



Larva

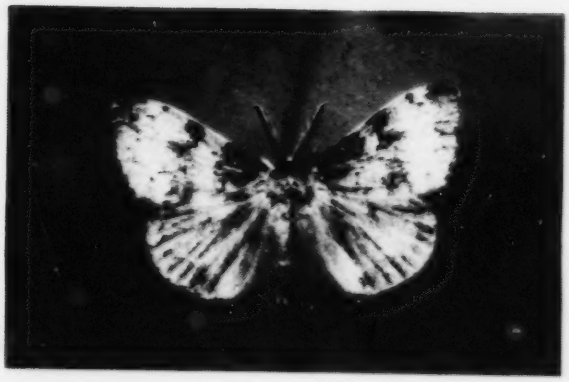


Egg mass



Pupa

Female



Male

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INSECTS

Major Insects

Spruce Budworm, *Choristoneura fumiferana* (Clem.)

No areas of major defoliation of spruce (*Picea* spp.) and balsam fir (*Abies balsamea* [L.] Mill.) were observed during aerial or ground surveys in the Region. In the province, a total of 6,780,446 ha of moderate-to-severe defoliation occurred in the North Central, Northwestern and Northern regions. The largest area of current defoliation occurred in North Central Region, where a total of 4,026,230 ha of severe defoliation were reported (Fig. 1).

Approximately 0.5 ha of open-grown white spruce (*Picea glauca* [Moench] Voss) trees sustained 15 to 25% defoliation in Hugel Township, North Bay District. Low population levels were also observed in Crerar Township, North Bay District. Elsewhere in the Region, trace population levels were found.

Egg-mass sampling conducted at 27 locations (Table 1) across the Region indicated that light, light-to-moderate and moderate damage could occur at seven locations. Populations appear to be most common in Wawa District, with light-to-moderate damage forecasts for Asselin, Dambrossio and McCron townships and moderate levels forecast at White Lake Provincial Park. One area of moderate defoliation is also forecast in Villeneuve Township, Blind River District.

Pheromone trapping was carried out in five districts across the Region (Table 2). A decrease in the number of males trapped occurred at most of the trapping sites.

Jack Pine Budworm, *Choristoneura p. pinus* Free.

No major areas of defoliation were observed in Northeastern Region. In other parts of the province, the infestations that had defoliated 248,311 ha of jack pine (*Pinus banksiana* Lamb.) in the Red Lake and Sioux Lookout districts declined to only 665 ha. However, a new infestation totaling 29,660 ha occurred in Parry Sound District (Fig. 2).

In Espanola District, trace levels of defoliation were found on 8-m jack pine trees over a 1-ha area in Merritt Township. Egg-mass sampling in this area (Table 3) enables us to predict a low level of infestation for 1991. Mortality plots established in 1985 were re-tallied in the Espanola and Sudbury districts (Table 4). No major changes have occurred and these plots will probably not be re-tallied in 1991.

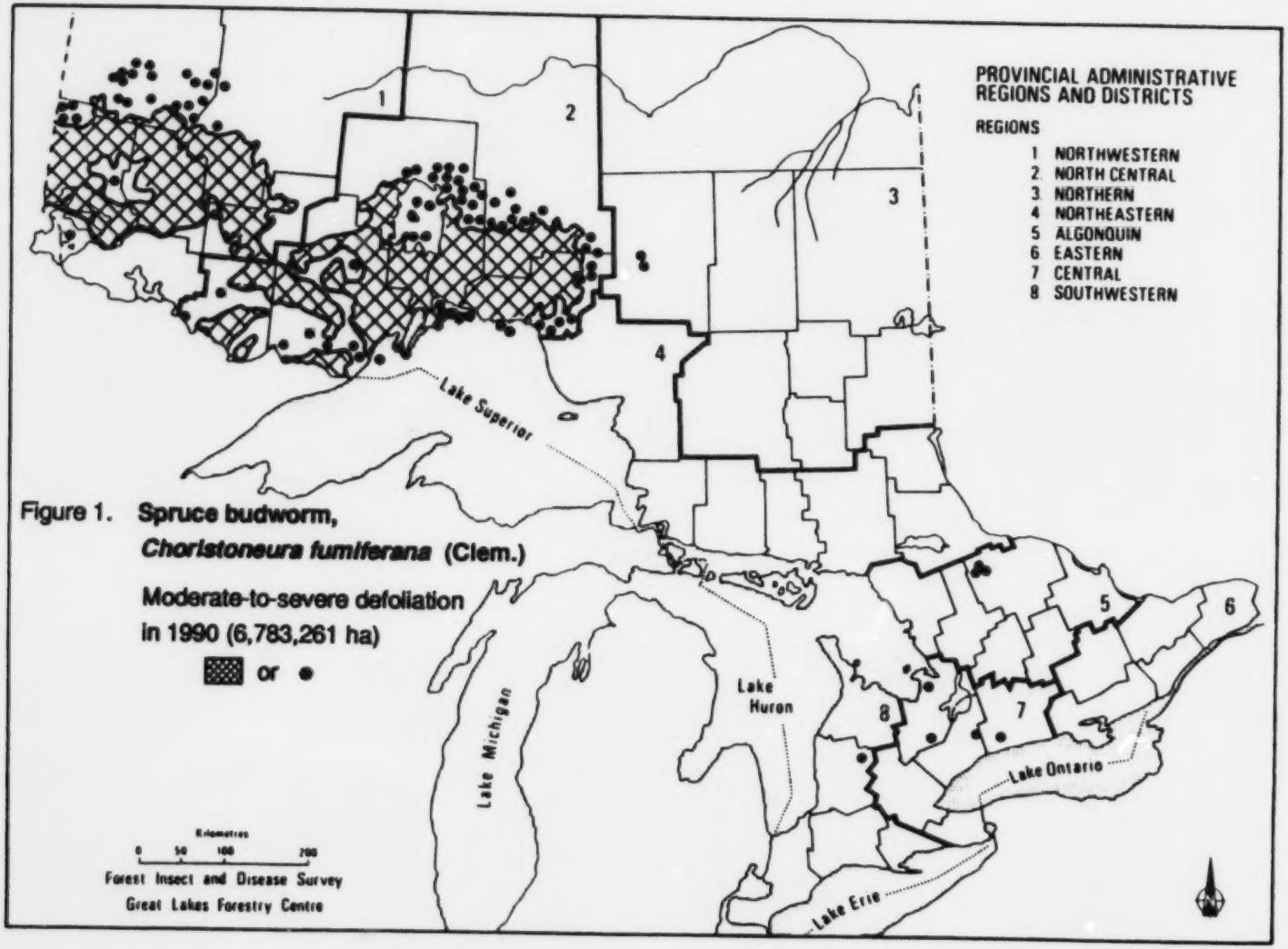

Figure 1. Spruce budworm, *Choristoneura fumiferana* (Clem.)

Moderate-to-severe defoliation in 1990 (6,783,261 ha)

▨ or ●

Table 1. Northeastern Region - spruce budworm: Summary of defoliation estimates and egg-mass counts in 1990, and infestation forecasts for 1991.

Location	Host	Estimated defol. in 1990 (%)	No. of egg masses per 9.29 m² of foliage	Infestation forecasts for 1991[a]	Accumulated damage[b]
Blind River District					
Kirkwood Twp - nursery area	wS	2	0	0	0
Nicholas Twp	bF	0	0	0	0
Villeneuve Twp	bF	2	50	M	0
Espanola District					
Boo[illegible] Twp	bF	0	16	L-M	0
Robinson Twp	wS	0	0	0	0
North Bay District					
Jocko Twp	bF	0	0	0	0
McBeth Twp	bF	0	7	L	0
Sisk Twp - Martin River Prov. Park	bF	0	0	0	0
Sault Ste. Marie District					
Aweres Twp	bF	0	0	0	0
Hodgins Twp	bF	2	0	0	0
Jollineau Twp	bF	2	0	0	0
Kincaid Twp	bF	0	0	0	0
Tarbutt Additional Twp	bF	2	0	0	0
Sudbury District					
Antrim Twp - Halfway Lake Prov. Park	wS	0	0	0	0
Cascaden Twp	bF	0	0	0	0
Temagami District					
Gillies Limit Twp	wS	0	0	0	0
Strathcona Twp	bF	0	0	0	0
Wawa District					
Asselin Twp	bF	0	16	L-M	+
Dahl Twp - Obatanga Prov. Park	bF	2	0	0	0
Dambrossio Twp - Impact Plot	bF	0	50	L-M	9
Lalibert Twp - Impact Plot	bF	0	0	0	9
LaRonde Twp	bF	0	0	0	0

(cont'd)

Table 1. Northeastern Region - spruce budworm: Summary of defoliation estimates and egg-mass counts in 1990, and infestation forecasts for 1991.

Location	Host	Estimated defol. in 1990 (%)	No. of egg masses per 9.29 m² of foliage	Infestation forecasts for 1991[a]	Accumulated damage[b]
Wawa District (concl.)					
Maness Twp	bF	0	0	0	0
McCron Twp	bF	42	29	L-M	1
Peever Twp	bF	0	0	0	+
Recollet Twp	bF	0	0	0	0
White Lake Prov. Park	bF	23	55	M	1

[a] S = severe, M = moderate, L = light, 0 = nil

[b] accumulated damage codes: 0 = undamaged; 1 = light damage, <25% total defoliation, usually one season of severe defoliation; 2 = moderate damage, 25 to 60% total defoliation, two or three seasons of severe defoliation; 3 = severe damage, 60 to 80% total defoliation, three to five seasons of severe defoliation, will recover; 4 = moribund or dying, 80 to 100% total defoliation, crowns gray in appearance, top 50-150 cm dead or bare; 5 = <25% of stand dead; 6 = 25-50% of stand dead; 7 = 50-70% of stand dead; 8 = >70% of stand dead; 9 = <25% of stand dead, no significant (0-25%) defoliation for several years; + = 25-50% of stand dead, no significant defoliation for several years; - = 51-70% of stand dead, no significant defoliation for several years.

Table 2. Spruce budworm pheromone trapping in five districts of the Northeastern Region of Ontario in 1990.

Location (Twp)	Total number of males captured	
	1989	1990
Blind River District		
Kirkwood	175	43
North Bay District		
Sisk	16	0
Sault Ste. Marie District		
Jollineau	36	15
Sudbury District		
Dowling	62	23
Wawa District		
Dambrossio Impact Plot	79	171
Lalibert Impact Plot	54	205

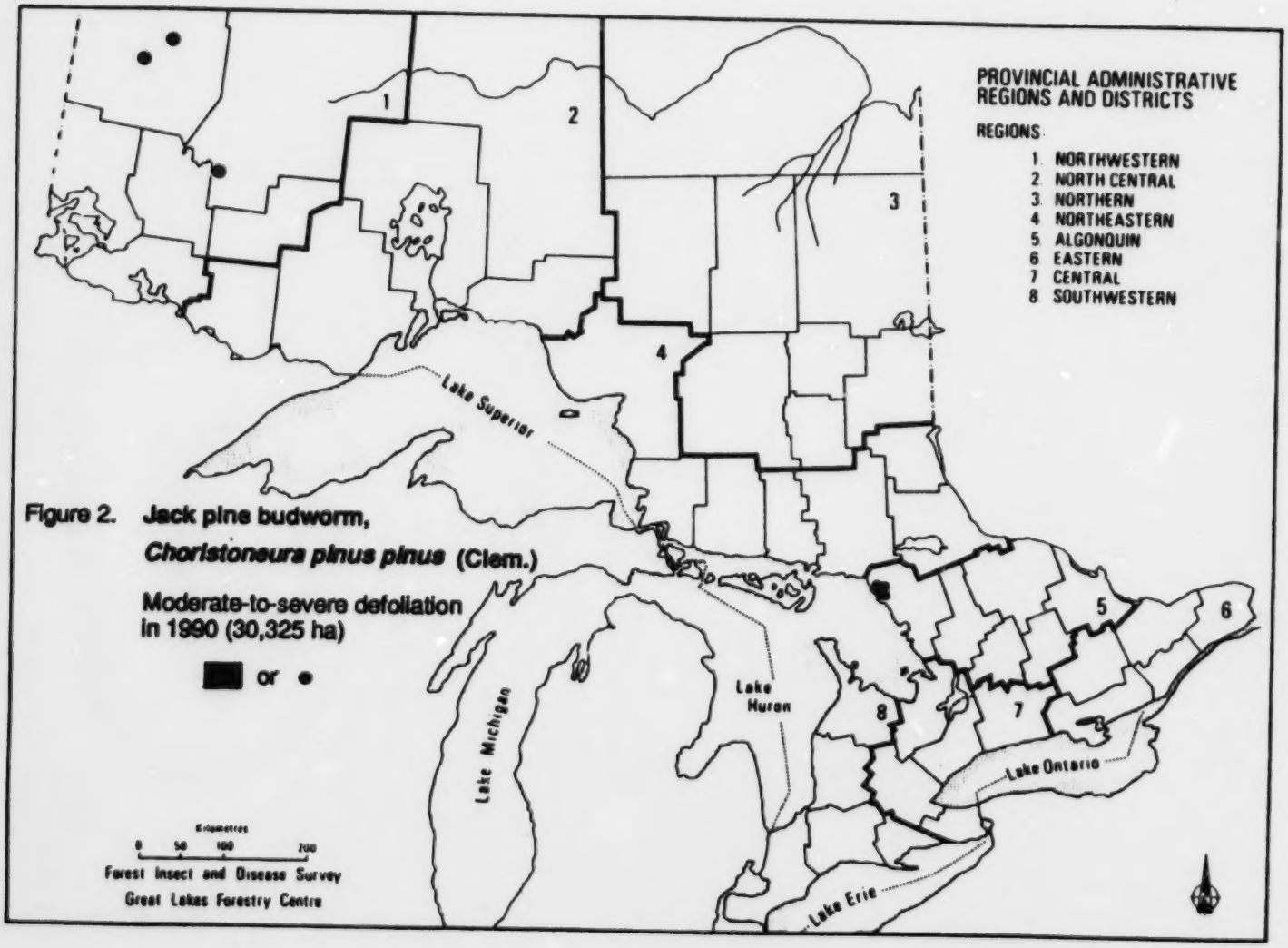

Figure 2. Jack pine budworm, ***Choristoneura pinus pinus*** (Clem.)

Moderate-to-severe defoliation in 1990 (30,325 ha)

■ or ●

Table 3. Jack pine budworm defoliation estimates and egg-mass counts in 1990 and infestation forecasts for 1991 on jack pine in the Northeastern Region of Ontario.

Location	Estimated % defol. (1990)	Total no. egg masses on six 61-cm branch tips	Infestation forecast for 1991[a]
Blind River District			
Bouck Twp	0	0	N
Gaunt Twp	0	0	N
Kirkwood Twp	0	0	N
Martel Twp	0	0	N
Nicholas Twp	0	0	N
Sagard Twp	0	0	N
Wells Twp	0	0	N
Yaremko Twp	0	0	N
Espanola District			
Gerow Twp	0	0	N
Lefebvre Twp	0	0	N
Merritt Twp	5	2	L
Robinson Twp	0	0	N
Teasdale Twp	0	0	N
Weeks Twp	0	0	N
North Bay District			
McNish Twp	0	0	N
Sudbury District			
Antrim Twp	0	0	N
Bigwood Twp	0	0	N
Cartier Twp	0	0	N
Cox Twp	0	1	L
Lumsden Twp	0	0	N
Temagami District			
Gillies Limit Twp	0	0	N
Wawa District			
Maness Twp	0	0	N
Recollet Twp	0	0	N

[a] N = nil, L = light, M = moderate, H = heavy

Table 4. Whole-tree mortality and the incidence of bare tops associated with damage caused by the jack pine budworm in the Northeastern Region of Ontario from 1987 to 1990 (counts based on 100 permanently marked trees).

Location (Twp)	Avg. DBH (cm)	Whole-tree mortality				Bare tops			
		1987	1988	1989	1990	1987	1988	1989	1990
Espanola District									
Gervais	22	13	17	17	18	6	19	24	22
Monestime Area 1	22	21	22	24	25	13	20	22	21
Monestime Area 2	13	10	14	15	19	27	39	39	40
Olinyk	24	13	14	14	15	5	2	2	3
Sudbury District									
Cartier	19	2	4	7	10	1	4	3	2
Cascaden	15	0	0	5	6	2	8	8	8
Cox	17	17	37	53	56	17	34	22	22
Hart	17	0	3	4	5	1	1	2	2
Ulster	17	4	20	23	25	2	1	1	1

Larch Casebearer, *Coleophora laricella* (Hbn.)

High population levels occurred at widely scattered locations in the Blind River, Espanola, North Bay and Sault Ste. Marie districts on tamarack (*Larix laricina* [Du Roi] K. Koch).

In Pedley Township, North Bay District, defoliation of 50 to 80% was recorded on trees 14 m in height in a 20-ha stand, and 40% defoliation occurred in a 6-ha stand along Highway 17 in Widdiefield Township of the same district. In Espanola District, 30 to 40% defoliation was observed on stands varying in area from 3 to 10 ha in Hallam, Salter and Tehkummah townships.

Defoliation ranging from 25 to 50% occurred in two areas of Sault Ste. Marie District. Along the Pointe aux Pins Road in Park Township, 25% defoliation occurred in a small stand of mature trees over an area of approximately 5 ha, with understory trees sustaining 75% defoliation. At one location in the Gorden Lake area of the Garden River Indian Reserve, 40 to 50% defoliation occurred over a 10-ha area on mature trees.

West of the village of Iron Bridge, in Gladstone Township, Blind River District, 75% defoliation occurred on semimature trees, but the area affected was less than 3 ha. In Haughton Township, 50 to 75% defoliation occurred on mature trees in a 10-ha stand.

Oak Leaf Shredder, *Croesia semipurpurana* (Kft.)

Ground and aerial surveys indicated that no infestations were present on red oak (*Quercus rubra* L.). Small numbers of larvae were observed feeding in Thessalon and Long townships of Blind River District and in the Hiawatha Park area, Tarentorus Township, Sault Ste. Marie District. In all of the above areas, defoliation was very light. Egg-mass sampling was once again carried out at four locations in these two districts and light defoliation is forecast for 1991 at three locations (Table 5). Results of the pheromone trapping are also included in the table.

Table 5. Oak leaf shredder pheromone trapping, defoliation estimates, and egg counts in 1990 and defoliation forecasts for 1991 in the Northeastern Region of Ontario.

	No. moths caught				Avg. no. per trap		Pheromone concentration (%)	Leaves attacked (%)	Foliar damage (%)	Total no. of eggs		Forecast for
	Multipher		Sticky									
Location	1989	1990	1989	1990	1989	1990	1990	1990	1990	1989	1990	1991
Blind River District												
Long Twp	806	18	714	146	253.3	27.3	0.03	0	0	7	0	Nil
Thessalon Twp			79	11	15.8	2.8	0.003	-[a]	-[a]	19	2	Light
Sault Ste. Marie District												
Hilton Twp	17	54	66	42	11.9	13.7	0.03	-[a]	-[a]	0	1	Light
Tarentorus Twp			101	8	20.2	1.6	0.003	0	0	7	5	Light

[a] defoliation by the forest tent caterpillar

Eastern Pine Shoot Borer, *Eucosma gloriola* Heinr.

Population levels of this shoot borer varied widely across the Region. Damage was most prevalent on jack pine, but damage was also observed on eastern white pine (*Pinus strobus* L.) and on red pine (*Pinus resinosa* Ait.). The incidence of trees affected ranged from 0.0 to 16.7%, with leader damage of up to 12% (Table 6).

The heaviest damage occurred in the Hallam Township jack pine seed orchard in Espanola District. At this location, 12% of the leaders were killed on the 2.3-m jack pine. A jack pine stand in Hurlburt Township, Sault Ste. Marie District, was also heavily damaged, with 11% of the leaders affected.

Table 6. Damage by the Eastern Pine Shoot Borer in the Northeastern Region of Ontario in 1990 (counts based on an examination of 150 randomly selected trees at each location).

Location (Twp)	Host	Estimated area of stand (ha)	Estimated density (trees/ ha)	Avg. ht. of trees (m)	Trees affected (%)	Leaders attacked (%)
Blind River District						
Kirkwood	jP	4	2,500	2.6	16.8	4.6
Lane (family test)	jP	4	2,500	2.0	2.0	2.0
Viel	jP	16	2,500	2.6	6.0	2.0
Espanola District						
Durban	jP	15	2,500	2.2	6.7	6.0
Hallam	jP	25	2,400	2.3	16.7	12.0
Merritt	jP	9	4,444	3.0	14.0	6.7
Tennyson	jP	4	2,500	1.4	2.7	2.7
Sault Ste. Marie District						
Curtis	jP	50	2,500	2.5	11.3	4.0
Hurlburt	jP	96	2,500	2.6	15.0	11.0
Smilsky (family test)	jP	4	2,500	1.9	4.6	1.3
Sudbury District						
Hanner	jP	3	2,500	2.5	6.0	2.0
Lumsden	jP	10	2,500	2.1	14.7	8.7
Moncrief	jP	4	3,000	1.7	2.7	2.0
Street	jP	4	2,100	2.0	6.0	5.3
Temagami District						
Canton	jP	20	4,222	2.3	1.3	0.7
Coleman	jP	6	2,500	2.1	14.2	1.1
Firstbrook	jP	2	2,500	0.8	0.0	0.0
Firstbrook	jP	18	2,500	0.6	0.0	0.0
Firstbrook	jP	7	2,500	0.5	0.0	0.0
Wawa District						
Chenard	jP	22	2,500	1.7	1.9	1.3
Esquega	jP	475	2,500	2.0	7.2	2.6

Pine Needleminer, *Exoteleia pinifoliella* (Cham.)

In 1989, 132 ha of moderate-to-severe needlemining was recorded at five locations across the Espanola, North Bay and Sudbury districts. However, the populations and areas of damage were reduced in 1990.

In Bigwood Township, Sudbury District, 5% defoliation occurred over an area of 15 ha; 5% defoliation occurred over a 5-ha area in Curtin Township, Espanola District, and 15% defoliation was reported in a 5-ha area in MacPherson Township, North Bay District. At all of the above sites, trees were mature and open-grown and averaged 12 to 16 m in height.

At one location within the city of Sault Ste. Marie, a small mixed jack pine and Scots pine (*Pinus sylvestris* L.) plantation sustained moderate-to-severe defoliation. At this site, jack pine trees approximately 4 m in height sustained 90% foliar damage and approximately 10% needle mining was observed on Scots pine trees.

Birch Leafminer, *Fenusa pusilla* (Lep.)

Severe leafmining was evident along Highway 522 in the Goulais River-Goulais Bay area of Sault Ste. Marie District. Single white birch (*Betula papyrifera* Marsh.) and small clumps of trees in the 2-12 m height range sustained severe (75 to 100%) leafmining. In many instances, premature loss of foliage occurred as a result of this severe leafmining. Many ornamentals throughout the city of Sault Ste. Marie had similar foliar damage. High population levels were also noted in natural stands near the village of Searchmount and several areas in Curtis and Whitman townships, Sault Ste. Marie District. Again, damage was only observed in small clumps and on single trees. Leafmining was between 80 and 100% in all of the above areas. Similar damage also occurred in Renwick Township of Blind River District.

Elsewhere in the Region, light (10 to 25%) leafmining was observed in the Espanola, North Bay, Sudbury, Temagami and Wawa districts.

Gypsy Moth, *Lymantria dispar* (L.)

Egg masses and larvae were found at several locations in the Espanola and Sudbury districts (Fig. 3). Defoliation was observed during ground surveys at the Wikwemikong Indian Reserve on Manitoulin Island.

Gypsy moth egg masses and larvae (see Frontispiece) were found at several locations on Manitoulin Island. Severe defoliation (70 to 90%) occurred in a 4-ha stand of red oak 0.5 km west of the town of Wikwemikong. It should be noted that a large population of the forest tent caterpillar was also located at the same site. In the fall of 1990, high gypsy moth egg-mass counts were recorded at this location. Smaller populations were found in scattered pockets throughout the Wikwemikong Indian Reservation, and only trace levels of defoliation occurred. Elsewhere on Manitoulin Island, small numbers of egg masses and larvae were found in Clover Valley and 2 km northwest of Manitowaning, both in Assiginack Township, and at the Lake Wolsey picnic area in Mills Township. In the spring, two egg masses were also found 1 km east of Gore Bay in Gordon Township.

At Fort La Cloche, Espanola District, two egg masses were found in May. Follow-up work in the fall produced no further egg-mass sightings; however, 16 egg masses were recorded in a 2-ha area of mature red oak at Sagamok Point in the Spanish Indian Reservation #5, 6 km west of Fort La Cloche (Fig. 3).

In Killarney Provincial Park of Sudbury District, small numbers of gypsy moth egg masses and larvae were recorded near the park office, and trace levels occurred throughout the park along Highway 637 and just east of the park. Egg masses were also found at two locations within the Sudbury city limits. The largest population occurred on Beaumont Street north of Lasalle Boulevard, where 12 egg masses were recorded on three linden (*Tilia* sp.) trees.

In Sault Ste. Marie District, egg masses were found at Bellevue Park, Maskinonge Bay, and at the Sault Ste. Marie locks in early May. Since then, no larvae or egg masses have been seen.

Gypsy moth pheromone trapping was conducted again in all districts of the Region. Positive results were obtained at all locations with the exception of three campgrounds in Wawa District (Table 7).

Elsewhere in the province, 77,648 ha of moderate-to-severe defoliation were mapped in the Eastern, Algonquin, Central and Southwestern regions. The bulk of this damage occurred in the Algonquin and Central regions, with 37,235 and 28,624 ha defoliated, respectively.

Forest Tent Caterpillar, *Malacosoma disstria* Hbn.

Moderate-to-severe defoliation continued at numerous locations in the Region (Fig. 4). However, 1990 is the first year in which the area of infestation decreased since the initial outbreak in 1986 (Fig. 5). Increases occurred in three districts and decreases in four districts (Table 8). The most noticeable increase (491,554 ha) occurred in Wawa District, whereas a collapse from 160,770 ha to 330 ha took place in Temagami District.

The main body of the infestation stretches from the city of Sault Ste. Marie eastward through parts of Blind River District, throughout most of the Espanola and Sudbury districts, and there was 101,003 ha of moderate-to-severe damage in the western part of North Bay District. Another 31,284 ha of moderate-to-severe defoliation also occurred between the southeastern side of Lake Nipissing and the town of Powasson. Moderate-to-severe defoliation also occurred throughout most of Manitoulin Island, Espanola District, and on St. Joseph Island, Sault Ste. Marie District.

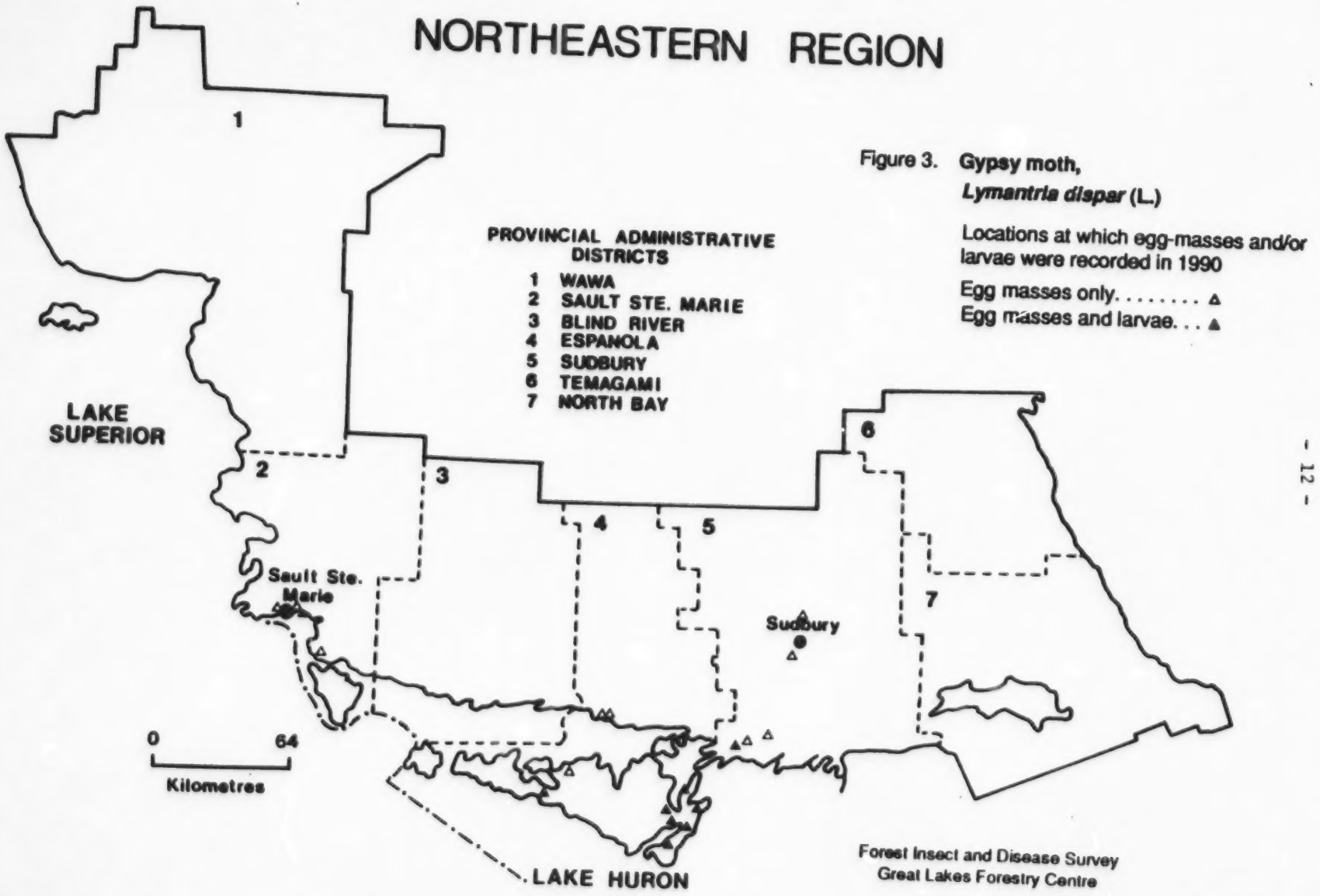

Figure 3. **Gypsy moth, *Lymantria dispar* (L.)**

Table 7. Results of gypsy moth pheromone trapping in the Northeastern Region of Ontario in 1989 and 1990.

Location	No. of traps		No. of males captured	
	1989	1990	1989	1990
Blind River District				
Mississagi Prov. Park	10	10	10	13
Espanola District				
Bidwell Township	6	1	8	26
Chutes Prov. Park	1	2	3	52
Gordon Township	5	2	9	54
South Baymouth - ferry dock	6	1	21	27
- trailer park	10	2	37	58
North Bay District				
Antoine Prov. Park	2	2	5	40
Lake Nipissing scenic lookout	5	1	18	32
Marten River Prov. Park	2	9	3	33
Restoule Prov. Park	9	2	45	41
Samuel de Champlain Prov. Park	2	2	12	19
Sault Ste. Marie District				
Pancake Bay Campgrounds	2	10	1	7
Sudbury District				
Fairbanks Prov. Park	2	10	6	53
Halfway Lake Prov. Park	2	2	missing	2
Killarney Prov. Park	6	2	35	43
Windy Lake Prov. Park	10	10	2	27
Temagami District				
Finlayson Point Prov. Park	10	2	0	13
Wawa District				
Agawa Bay Campgrounds	2	10	3	1
Cresent Lake Campgrounds	0	2	0	0
Obatanga Prov. Park	1	2	0	0
Rabbit Blanket Campgrounds	10	10	1	1
White Lake Prov. Park	2	2	0	0

In Wawa District, the largest body of infestation (457,875 ha) was mapped from Dahl Township north into Matthews Township, west to the Hemlo area of Terrace Bay District, and south into Pukaskwa National Park. Farther east of this large area, 18,485 ha of moderate-to-severe defoliation of trembling aspen (*Populus tremuloides* Michx.) occurred in the Dubreuilville

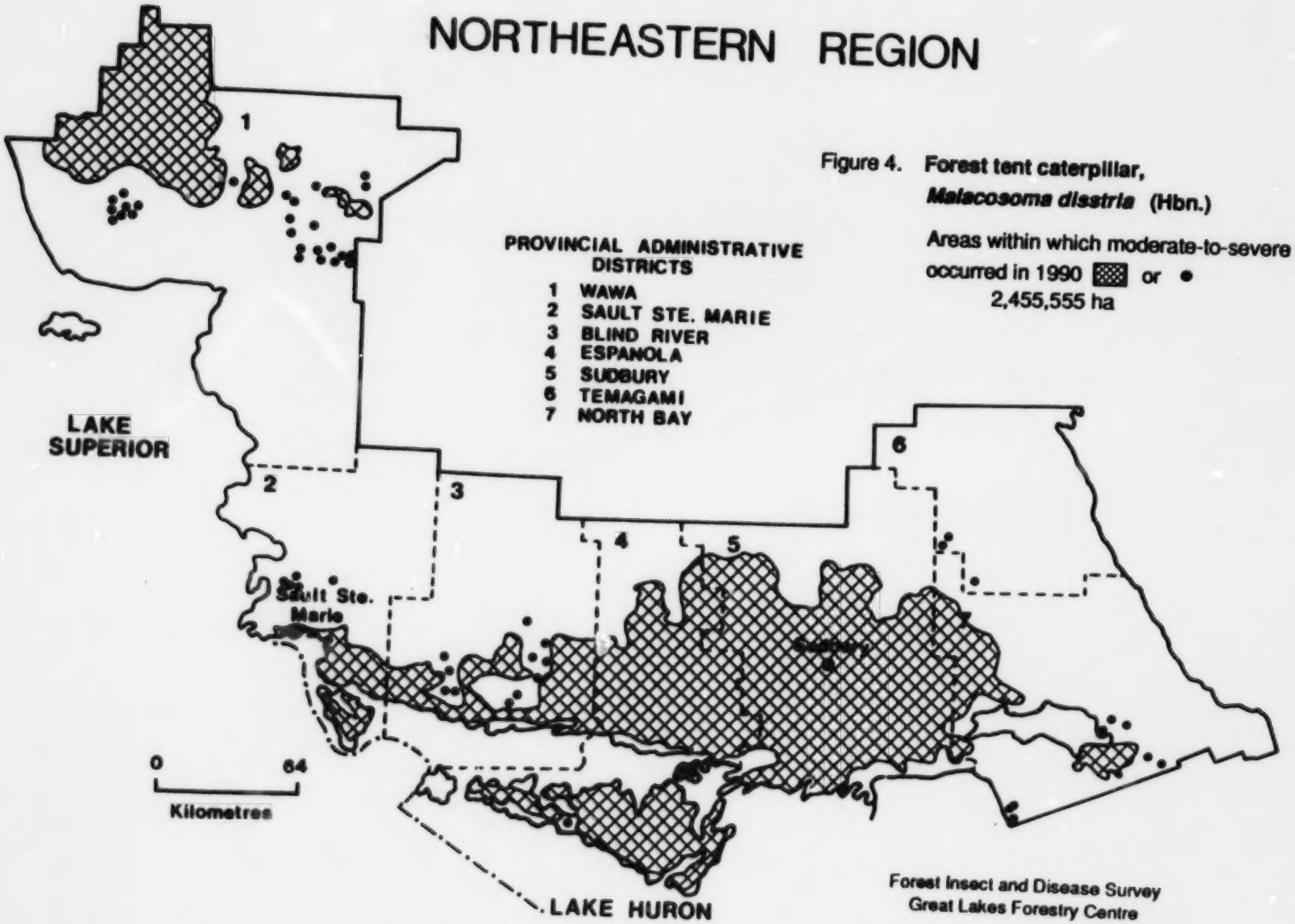

Figure 4. **Forest tent caterpillar, *Malacosoma disstria* (Hbn.)**

Areas within which moderate-to-severe defoliation occurred in 1990 ▩ or ●
2,455,555 ha

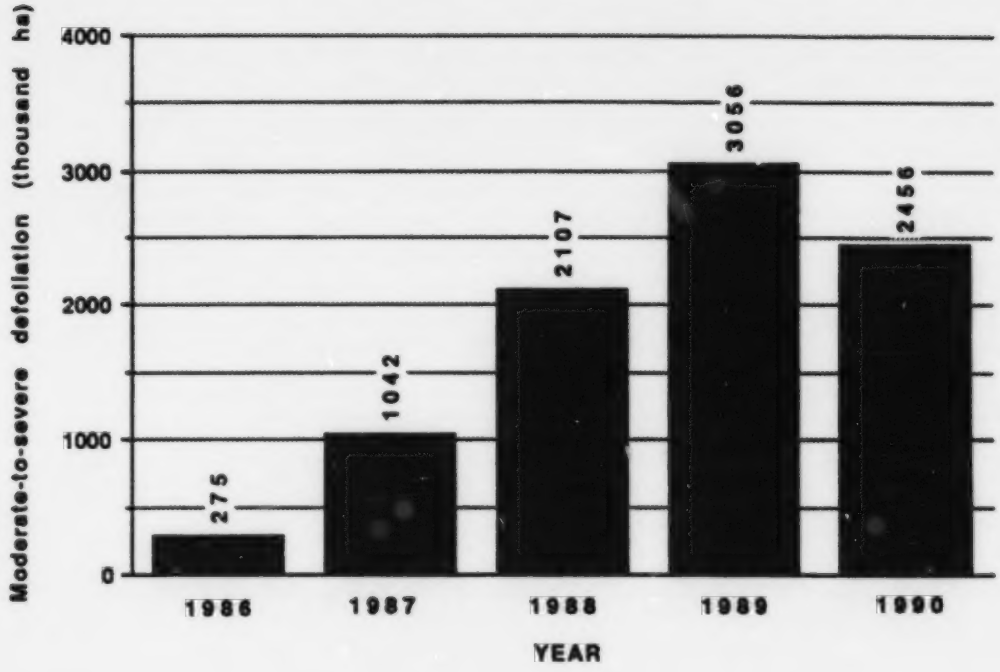

Figure 5. Defoliation by the forest tent caterpillar in the Northeastern Region of Ontario from 1986 to 1990.

Table 8. Gross area of moderate-to-severe defoliation by the forest tent caterpillar from 1988 to 1990 in the Northeastern Region of Ontario.

	Defoliation (ha)			Change (ha)	
District	1988	1989	1990	1989	1990
Blind River	102,852	208,878	200,445	+106,026	-8,433
Espanola	415,273	615,345	657,717	+200,072	+42,372
North Bay	856,053	1,031,622	145,570	+175,869	-886,052
Sault Ste. Marie	25,360	116,107	102,669	+89,547	-13,438
Sudbury	442,274	843,409	849,127	+401,135	+5,718
Temagami	252,650	160,770	330	-91,880	-160,440
Wawa	12,087	80,143	499,697	+68,026	+419,554
Total	2,107,749	3,056,274	2,455,555	+948,825	-600,719

area of Wawa District, and encompassed parts of Atkinson, Tilson, Carmody, Chenard, Dumas and Dunphy townships. Another 11,041 ha were again mapped in the Missanabi-Dog Lake area. A new area of approximately 8,484 ha occurred in the Franz area and the southern parts of the Esnagi Lake area. Numerous small, isolated pockets south of the above areas ranging from 50 to 480 ha in size were mapped in Wawa District.

As in the past, the most commonly defoliated hosts were trembling aspen, followed by sugar maple (*Acer saccharum* Marsh.). In many areas, especially east of Sault Ste. Marie District, oaks (*Quercus* spp.), ashes (*Fraxinus* spp.), and elms (*Ulmus* spp.) were completely stripped, as were many ornamental plantings such as apple (*Malus* spp.).

Egg-band sampling (Table 9, Fig. 6) conducted at 117 locations indicates moderate-to-severe defoliation will continue in many areas of the Region. The infestation in the North Bay area should collapse and decreases in the area affected are expected to occur in parts of the Blind River and Sault Ste. Marie districts. High population levels are expected to persist in most parts of Wawa District; however, infestations in the Dog Lake and Missanabi areas should collapse, as indicated by very low egg-band counts on sample trees.

The large flesh fly (*Arachnidomyia eldrichi* [Park.]) was observed at numerous locations in the Region, as was the fungus *Furia crustosa* MacLeod (Tyrrell) Humber, both of which could help reduce population levels.

Table 9. Forest tent caterpillar egg-band counts conducted on trembling aspen in the Northeastern Region of Ontario in 1990 and infestation forecasts for 1991.

Location	Mean DBH (cm)	Mean no. of egg bands	Infestation forecast for 1991[a]
Blind River District			
Albanel Twp	15.0	1.6	L
Bouck Twp	16.0	8.6	M
Bright Twp	11.6	5.3	M
Gladstone Twp	10.0	7.3	S
Gould Twp	12.0	5.0	M
Gunterman Twp	17.0	39.0	S
Hembruff Twp	10.0	7.0	S
Lewis Twp	11.6	7.3	S
Kirkwood Twp	11.0	9.0	S
Lefroy Twp	9.6	7.0	S
Long Twp	12.0	40.0	S
Nicholas Twp	9.3	1.6	L
Parkinson Twp	8.0	5.0	M
Patton Twp	11.0	4.6	M

(cont'd)

Table 9. Forest tent caterpillar egg-band counts conducted on trembling aspen in the Northeastern Region of Ontario in 1990 and infestation forecasts for 1991 (cont'd).

Location	Mean DBH (cm)	Mean no. of egg bands	Infestation forecast for 1991[a]
Blind River District (concl.)			
Proctor Twp	14.0	20.0	S
Raimbault Twp	12.6	12.6	S
Sagard Twp	10.0	1.3	S
Scarfe Twp	11.0	3.0	M
Serpent River Indian Res.	11.0	6.0	S
Spragge Twp	10.0	19.0	S
Striker Twp	11.0	11.0	S
Striker Twp (Duborne Lk)	9.0	13.0	S
Thompson Twp	10.6	9.0	S
Espanola District			
Billings Twp	14.5	29.0	S
Campbell Twp	13.2	23.0	S
Curtin Twp	10.7	15.3	S
Dawson Twp	12.9	8.0	S
Gerow Twp	13.5	8.7	S
Gervais Twp	11.9	0.7	L
Gordon Twp	14.2	7.7	S
Great La Cloche Island	12.1	24.0	S
Howland Twp	14.6	46.0	S
McKinnon Twp	14.6	29.0	S
Monestime Twp	13.2	1.0	L
Nairn Twp	11.8	20.0	S
Robinson Twp	12.7	19.0	S
Rowat Twp	14.8	20.0	S
Salter Twp	12.8	7.0	S
Shakespeare Twp	12.8	25.0	S
Shedden Twp	13.9	32.0	S
Sheguiandah Twp	12.9	23.0	S
Teasdale Twp	14.5	13.3	S
Tehkummah Twp	10.8	1.7	M
Weeks Twp	14.1	15.7	S
Wikwemikong I.R. (North)	14.9	35.0	S
Wikwemikong I.R. (South)	13.2	9.3	S
North Bay District			
East Ferris Twp	14.6	10.7	S
East Mills Twp	13.2	4.7	M
Gibbons Twp	17.2	41.0	S
Hugel Twp	14.4	4.0	M

(cont'd)

Table 9. Forest tent caterpillar egg-band counts conducted on trembling aspen in the Northeastern Region of Ontario in 1990 and infestation forecasts for 1991 (cont'd).

Location	Mean DBH (cm)	Mean no. of egg bands	Infestation forecast for 1991[a]
North Bay District (concl.)			
MacBeth Twp	14.6	3.0	M
MacPherson Twp	12.3	13.0	S
Nipissing Twp	14.7	11.0	S
Pardo Twp	11.9	10.3	S
Springer Twp	11.6	1.3	L
Sault Ste. Marie District			
Fenwick Twp	10.6	4.6	M
Fort Creek	9.0	3.0	M
Harmony Bay	11.0	0.0	N
Haviland Bay	9.0	1.3	L
Highway 17B (Finn Hill)	11.0	2.6	M
Hodgins Twp (Searchmount)	8.0	2.6	M
Johnson Twp (Desbarats Lk)	11.6	7.0	S
Laird Twp (Lakeview Rd.)	9.3	0.6	T
MacDonald Twp (Echo Lake Road)	10.3	0.3	T
MacDonald Twp (Watson's side road)	11.6	4.0	M
Park Twp (Point des Chênes)	13.0	10.0	S
Plummer Additional Twp (Ottertail Lake)	11.0	6.0	S
Prince Twp (Wall's side road)	13.0	3.0	M
Pine Street Hill	10.0	2.6	M
Tarentorous Twp (Hiawatha Park)	12.0	3.0	M
Tarentorous Twp (Rankin Indian Res.)	11.0	4.6	M
Vankoughnet (Kirby's Corner)	11.0	10.0	S
Tarbutt Additional	15.0	2.0	L
St. Joseph Island			
D-line road	9.0	2.6	M
I-line road	9.3	8.0	S
Milford Haven	9.0	8.0	S
Richardson Point	9.0	5.0	M
Whiskey Bay	9.6	7.6	S

(cont'd)

Table 9. Forest tent caterpillar egg-band counts conducted on trembling aspen in the Northeastern Region of Ontario in 1990 and infestation forecasts for 1991 (concl.).

Location	Mean DBH (cm)	Mean no. of egg bands	Infestation forecast for 1991[a]
Sudbury District			
Antrim Twp	12.0	2	M
Appleby Twp	12.9	12.0	S
Aylmer Twp	12.0	25.0	S
Bigwood Twp	14.2	23.0	S
Burwash Twp	14.4	29.0	S
Dieppe Twp	12.9	19.0	S
Dryden Twp	15.5	136.0	S
Eden Twp	14.8	14.0	S
Graham Twp	13.3	7.3	S
Grigg Twp	13.5	1.0	L
Humbolt Twp	11.8	10.3	S
Hutton Twp	12.0	6.7	S
Killarney Provincial Park	14.7	19.0	S
Leinster Twp	13.1	2.7	M
Levack Twp	12.3	11.0	S
Loughrin Twp	14.7	55.0	S
Lumsden Twp	14.1	23.0	S
Maclennan Twp	14.4	41.0	S
Martland Twp	12.1	9.3	S
Moncrieff Twp	12.4	10.3	S
Rathburn Twp	12.6	2.7	M
Trill Twp	14.5	39.0	S
Venturi Twp	12.3	61.0	S
Waldie Twp	13.1	20.0	S
Wawa District			
Abraham Twp	11.0	19.0	S
Atkinson Twp	17.0	33.0	S
Chapais Twp (Obatanga Pk)	11.0	100.0	S
Dahl Twp (Fungus Lk)	16.0	97.0	S
Dahl Twp	9.0	11.0	S
Dumas Twp	10.6	10.0	S
Dumphy Twp	10.6	3.3	M
Mikano Twp	12.0	43.0	S
Pearkes Twp	14.0	78.0	S
Rennie Twp	10.6	0.3	T
Strickland Twp	10.0	11.5	S
Tilson Twp	18.0	56.0	S
West Twp	10.0	1.0	L
White Lake Prov. Pk	13.0	31.5	S

[a] N = Nil, T = Trace, L = Low, M = Moderate, S = Severe

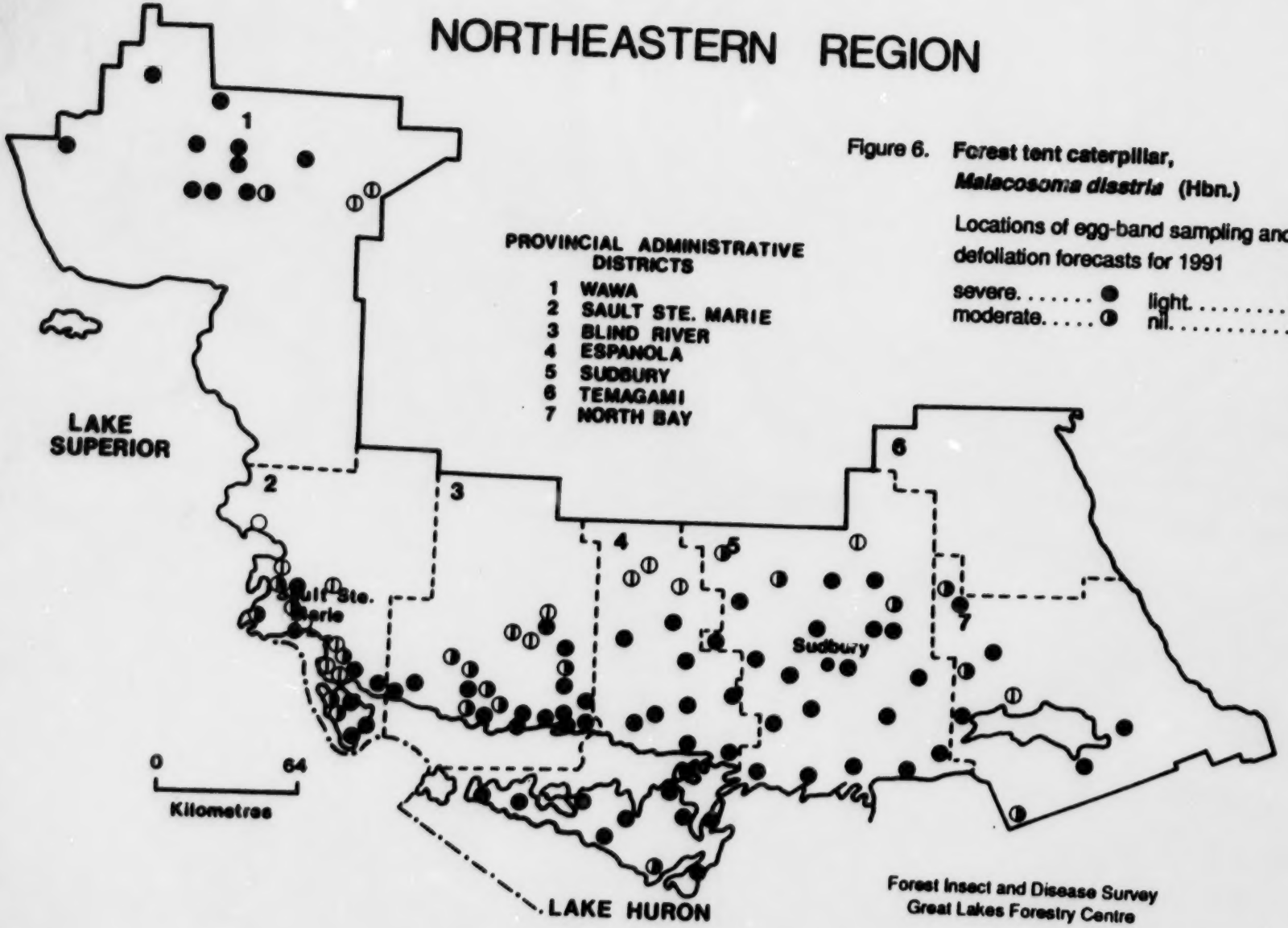

Figure 6. **Forest tent caterpillar, *Malacosoma disstria* (Hbn.)**

Locations of egg-band sampling and defoliation forecasts for 1991

Redheaded Pine Sawfly, *Neodiprion lecontei* (Fitch)

Populations of this defoliator were more commonly observed in 1990, especially in Parkinson Township, Blind River District, and throughout the southern portion of the Espanola and North Bay districts. A wide range of defoliation was observed and it was not unusual to observe single trees and plantations of red pine totally stripped of foliage.

This insect was most abundant in several areas of Espanola District (Gough, Shakespeare and Tennyson townships) and the proportion of trees affected ranged from 17 to 97% (Table 10), with foliar damage varying from 6 to 75%. In Shakespeare Township, 40% mortality was recorded on trees 2.2 m in height over an area of approximately 5 ha. At one location in Parkinson Township, Blind River District, 97% of red pine trees approximately 1 m tall had 83% foliar damage. Many of the trees were entirely stripped and much mortality has taken place. In North Bay District, an evaluation in Bonfield Township revealed 47% of 2.2-m trees sustained 5% defoliation.

Table 10. Estimates of defoliation caused by the redheaded pine sawfly in three districts of the Northestern Region of Ontario in 1990 (counts based on an examination of 150 randomly selected trees at each site).

Location (Twp)	Host	Estimated stand area (ha)	Avg. ht. of trees (m)	Trees affected (%)	Avg. defoliation (%)
Blind River District					
Parkinson	rP	5	1.0	97.0	83.0
Parkinson	rP	5	1.9	16.0	25.0
Espanola District					
Gough	rP	20	2.9	97.3	69.5
Gough	rP	8	2.9	17.0	6.0
Hallam	jP	25	2.3	1.0	5.0
Nairn	jP	3	1.1	5.0	65.0
Shakespeare	rP	5	2.2	94.0	65.0
Shakespeare	rP	4	0.4	80.7	76.5
Tennyson	rP	4	2.8	49.0	43.0
North Bay District					
Bonfield	rP	4	2.1	47.0	5.0
Olrig	rP	100	3.1	9.3	2.7

Several spray operations were also carried out by OMNR and E.B. Eddy staff. In Espanola District, the nuclear polyhedrosis virus was applied on jack pine and red pine trees and the chemical malathion was applied on red pine in Olrig Township, North Bay District. Spraying operations are expected

to be carried out in 1991 in the Blind River, Espanola and North Bay districts.

White Pine Weevil, *Pissodes strobi* (Peck)

Population levels of this insect remained much the same as in 1989; however, a few areas showed large increases in 1990. In the areas evaluated, the number of leaders attacked ranged from 0 to 36% (Table 11). The highest percentage of damaged leaders occurred in Sisk Township, North Bay District, where 36% of the leaders were destroyed on the 1.9-m eastern white pine.

Table 11. Damage by the white pine weevil in pine plantations in the Northeastern Region of Ontario in 1990 (counts based on an examination of 150 randomly selected trees at each site).

Location (Twp)	Host	Estimated stand area (ha)	Estimated no. of trees per ha	Avg. ht. of trees	Leaders attacked (%)
Blind River District					
Kirkwood	jP	4	2,500	2.6	2.6
Lane	jP	50	2,500	3.8	4.6
Lane (family test)	jP	4	2,500	2.0	2.6
Timbrell	rP	25	2,500	1.8	5.3
Viel	jP	16	2,500	2.6	13.0
Espanola District					
Durban	jP	15	2,500	2.2	1.3
Hallam	jP	25	2,400	2.3	0.7
Mandamin	jP	3	2,100	2.2	7.3
Merritt	jP	9	4,444	3.0	1.3
Nairn	jP	5	4,000	1.7	3.0
Robinson	jP	4	2,100	1.7	1.3
Tennyson	ewP	7	2,300	1.7	17.3
Tennyson	jP	4	2,500	1.4	8.7
North Bay District					
Antoine	ewP	7	2,000	1.4	1.3
Gurd	ewP	4	1,600	7.6	5.0
Mattawan	ewP	2	1,800	1.7	28.0
Mattawan	ewP	1	2,200	1.7	24.0
Mattawan	ewP	10	750	0.9	0.0
Pardo	ewP	5	1,900	2.4	18.0
Sisk	ewP	4	1,600	1.9	36.0
Sault Ste. Marie District					
Curtis	jP	50	2,500	2.5	13.0
Hurlburt	jP	96	2,500	2.6	23.0
Smilsky (family test)	jP	4	2,500	1.9	4.0

(cont'd)

Table 11. Damage by the white pine weevil in pine plantations in the Northeastern Region of Ontario in 1990 (counts based on an examination of 150 randomly selected trees at each site) (concl.).

Location (Twp)	Host	Estimated stand area (ha)	Estimated no. of trees per ha	Avg. ht. of trees	Leaders attacked (%)
Sudbury District					
Hamner	jP	3	2,500	2.5	5.3
Lumsden	jP	10	2,500	2.1	8.0
Moncrief	jP	4	3,000	1.7	4.0
Street	jP	4	2,100	2.0	4.7
Temagami District					
Canton	jP	20	4,222	2.3	4.0
Coleman	jP	6	2,500	2.1	2.0
Coleman	jP	5	2.500	2.7	2.0
Firstbrook	jP	2	2,500	0.8	0.0
Firstbrook	jP	18	2,500	0.6	0.0
Firstbrook	jP	7	2,500	0.5	0.7
Milne	ewP	40	2,000	1.2	1.3
Olive	ewP	5	3,422	1.2	1.3
Wawa District					
Alanen	jP	40	4,167	2.8	0.0
Alanen	bS	5	1,000	1.5	17.3
Cecile	jP	35	2,500	2.5	4.0
Chenard	jP	22	2,500	1.7	4.6
Esquega	jP	457	2,500	2.0	2.6
Vasiloff	jP	100	3,000	1.6	2.0

Table 12. Other forest insects.

Insect	Host(s)	Remarks
Acantholyda erythrocephala (L.) Pine False Webworm	rP	Light (1 to 5%) damage was reported at various locations across the Espanola and North Bay districts. The heaviest damage occurred in Chisholm Twp, North Bay District, where 3% of the trees were affected, with 5% defoliation over a 0.5-ha area.

(cont'd)

Table 12. Other forest insects.

Insect	Host(s)	Remarks
Aceria sp. nr. *dispar* (Nal.) Aspen Leaf Mite	tA	Many galls were observed in Tarentorus Twp, Sault Ste. Marie District, and the Boltan Road area of Gladstone Twp, Blind River District.
Adelges abietis (L.) Eastern Spruce Gall Adelgid	wS	This insect was commonly observed throughout the Region. The heaviest damage observed was in Mason Twp, Sudbury District, where 10% of shoots were infested in a 1-ha plantation.
Aphrophora cribrata (Wlk.) Pine Spittlebug	pine	The area of heaviest damage occurred in Cox Twp, Sudbury District. A 3-ha area had 80% of the trees affected, whereas 39% were infested over 40 ha in Alanen Twp, Wawa District.
Archips negundana (Dyar) Larger Boxelder Leafroller	mM	Extremely high population levels of this insect occurred in the city of Sudbury, with 90% defoliation occurring on trees 4 to 9 m in height.
Argyresthia aureoargentella Brower Cedar Leafminer	eC	Low population levels occurred on the southern coast of Manitoulin Island.
Bucculatrix canadensisella Cham. Birch Skeletonizer	wB	Heavy (75 to 100%) skeletonizing occurred in Huotari Twp, Wawa District. Areas affected ranged from 3 to 5 ha.
Choreutis pariana (Cl.) Apple-and-thorn Skeletonizer	Apple	Moderate-to-severe skeletonizing of foliage occurred at numerous locations throughout the city of Sault Ste. Marie. Defoliation ranged from 50 to 100%.
Conophthorus banksianae McP. Jack Pine Tip Beetle	jP	In Lumsden Twp, Sudbury District, 16% of the 2-m trees, 14% of the 3-m trees in Merritt Twp, Espanola District, and 7% of the 2.6-m trees in a 16-ha plantation in Lane Twp, Blind River District, were affected.

(cont'd)

Table 12. Other forest insects (cont'd).

Insect	Host(s)	Remarks
Corthylus punctatissimus (Zimm.) Pitted Ambrosia Beetle	sM	75% of sugar maple regeneration 0.5 to 1 m tall were killed over a 3-ha area in the Maple Ridge area of Thessalon Twp, Blind River District.
Hyphantria cunea (Drury) Fall Webworm	deciduous	Small numbers of tents were observed in Shields Twp and at scattered locations on St. Joseph Island, Sault Ste. Marie District, and in Drury Twp, Sudbury District.
Malacosoma americanum (F.) Eastern Tent Caterpillar	cherry	Large numbers of tents were observed throughout Lefroy, Thessalon and Kirkwood twps, Blind River District, and at numerous locations in Burpee and Carnarvon twps on Manitoulin Island, Espanola District.
Malacosoma californicum pluviale Dyar Northern Tent Caterpillar	deciduous	This caterpillar was commonly observed at numerous locations throughout Wawa District.
Neodiprion nanulus nanulus Schedl. Red Pine Sawfly	rP, jP	The sawfly caused approximately 20% defoliation on small clumps of trees in Common Twp, Wawa District, and at Ramsey Lake, Sudbury District. Single colonies were observed in Sagard Twp, Blind River District, and in Doucett Twp, Wawa District.
Neodiprion sertifer (Geoff.) European Pine Sawfly	scP	80% defoliation occurred over a 1-ha area in Carnarvon Twp, Espanola District. Light defoliation occurred in Kirkwood Twp, Blind River District, and at Hiawatha Park, Sault Ste. Marie District.
Neodiprion swainei Midd. Swaine Jack Pine Sawfly	jP	Light defoliation was observed on Island 127 in Lake Temagami, Temagami District, where moderate-to-severe defoliation has occurred for several years.

(cont'd)

Table 12. Other forest insects (concl.).

Insect	Host(s)	Remarks
Neodiprion virgiana complex Redheaded Jack Pine Sawfly	jP	Single colonies were observed at numerous locations in the Region.
Pikonema alaskensis (Roh.) Yellowheaded Spruce Sawfly	wS, bS	Single trees and small clumps of trees (2 m in height) in Bigwood Twp, Sudbury District, sustained 75% defoliation, and 50% defoliation was reported on 2-m trees in Widdifield Twp, North Bay District. Moderate-to-severe (75%) defoliation occurred on scattered trees in Finlayson Prov. Park, Temagami District.
Pineus strobi (Htg.) Pine Bark Adelgid	wP	Low population levels were observed in Mattawan Twp, North Bay District, and in Street Twp, Sudbury District.
Pristiphora geniculata (Htg.) Mountain-ash Sawfly	aMo	The sawfly was commonly observed, causing an average of 50% defoliation at many locations in the Sault Ste. Marie and Blind River districts. In the northern portion of Temagami District, 50% defoliation occurred on single trees and in small clumps of trees.
Tetralopha aplastella (Hlst.) Aspen Webworm	tA,wB	The webworm was commonly observed in Hunt Twp, Wawa District, with up to 10% defoliation occurring.
Trichlochmaea decora Say Gray Willow Leaf Beetle	willow	Severe (80 to 90%) skeletonizing of foliage occurred for approximately 0.5 km along the Red Squirrel Road, Aston Twp, Temagami District.
Zelleria haimbachi Bsk. Pine Needle Sheathminer	jP	The sheathminer caused between 50 and 75% needle mining over approximately 1 ha of jack pine trees in Hiawatha Park, Sault Ste. Marie District, and 5% needle mining at one location in Sagard Twp, Blind River District.

TREE DISEASES

Major Diseases

Armillaria ostoyae (Romagn.) Herink

The Armillaria root rot fungus is known to attack and kill all tree species, especially trees that have been weakened by other factors such as drought. Over the past few years, this pathogen has been commonly observed at low levels, usually in the 1-2% range. However, 4.6% current mortality occurred in 1990 at a progeny-test site in Kirkwood Township, Blind River District. Although not evaluated in 1989, this same area has been evaluated in 1988, when 6% mortality had occurred. As a result of this current and past mortality, and since the disease tends to kill trees in small clumps, undesirable gaps in the stand have developed at this site. The areas evaluated are summarized in Table 13.

Table 13. Damage caused by Armillaria root rot in 17 plantations in the Northeastern Region of Ontario in 1990 (counts based on an examination of 150 trees at each location).

Location (Twp)	Host	Estimated stand area (ha)	Avg. ht. of trees (m)	Current mortality (%)
Blind River District				
Kirkwood (progeny test)	jP	4	2.6	4.6
Lane (family test)	jP	4	2.0	0.0
Viel	jP	16	2.2	0.0
Espanola District				
Hallam	jP	25	2.3	0.7
Robinson	jP	4	1.7	0.7
Tennyson	wP	7	1.7	2.0
North Bay District				
Gurd	wP	4	7.6	0.0
Mattawan	wP	2	1.7	1.3
Sault Ste. Marie District				
Smilsky (family test)	jP	4	2.7	4.0
Sudbury District				
Lumsden	jP	10	2.1	0.7
Street	jP	4	2.0	0.7
Temagami District				
Coleman (seed orchard)	jP	15	2.3	0.7

(cont'd)

Table 13. Damage caused by Armillaria root rot in 17 plantations in the Northeastern Region of Ontario in 1990 (counts based on an examination of 150 trees at each location) (concl.).

Location (Twp)	Host	Estimated stand area (ha)	Avg. ht. of trees (m)	Current mortality (%)
Wawa District				
Alanen	jP	40	2.8	2.0
Chenard	jP	23	1.7	0.0
Cecile	jP	35	2.5	1.4
Cecile	jP	40	3.7	0.0
Vasiloff	jP	100	1.6	0.0

Scleroderris Canker, *Ascocalyx abietina* (Lagerb.) Schäpfer-Bernhard

Surveys were intensified in the Region, particularly in North Bay District, to determine the extent of infection caused by the North American race and the more virulent European race of *A. abietina*. The European race has been recorded in Strong Township, Bracebridge District, just south of Trout Creek, North Bay District; however, only the North American race has been collected to date in Northeastern Region.

Damage by the North American race of this fungus was detected in four districts of the Region. In a jack pine "family test site" in Smilsky Township, Sault Ste. Marie District, 69% of the 2.7-m trees were affected over a 4-ha area. Damage was confined to branches below 0.5 m in height. An incidence level of 75% occurred in a 1-ha stand of 2.5-m red pine trees in Parkinson Township, Blind River District; the lower branches (first whorl) were killed, but no tree mortality was observed. In Olrig Township, North Bay District, 23% of the 1.8-m red pine sustained 6.6% defoliation over a 3-ha area; whole-tree mortality levels have not exceeded 2% to date in this area. An incidence of 12% was observed in a 4-ha area of jack pine averaging 0.6 m tall at a location in Recollet Township, Wawa District.

White Pine Blister Rust, *Cronartium ribicola* J.C. Fischer

This rust fungus continues to be a problem in young eastern white pine plantations in the Temagami and North Bay districts. Low levels of incidence commonly occurred across the rest of the Region. The most severe damage was recorded in a 5-ha stand in Olive Township, Temagami District. At this location, 34% of the 1.4-m eastern white pine were infected, of which 14% were main-stem infections. In Antoine Township, North Bay District, 12% of the 1.4-m pine were affected, 8.7% severely, over a 30-ha area.

Western Gall Rust, *Endocronartium harknessi* (J.P. Moore) Y. Hirats.

This disease, which can kill small trees, was common in several jack pine plantations in the Region. The incidence of infected trees ranged from 2 to 61%, with trees ranging from 1 to 2.6 m in height. In Blind River District, the highest level of affected trees occurred in Lane Township over an area of 16 ha. Here, the incidence of infection was 61%, and 39% of the trees had galls on the main stem on trees averaging 2.6 m in height. In Viel Township, 6% of 2-m trees had galls present, but only the branches were affected.

In Mandamin and Robinson townships of Espanola District and Muldrew Township of Sudbury District, 2% of trees 1 to 3 m in height were affected. In Wawa District, 4.7 and 5.3% of jack pine trees were affected in Alanen and Vasiloff townships, respectively. Tree heights averaged 3.7 and 1.6 m, respectively, over areas of 50 and 100 ha. Again, damage was mainly to lateral branches. Elsewhere in the Region, very little damage was observed.

Table 14. Other forest diseases.

Disease	Host(s)	Remarks
Coleosporium asterum (Dietel) Sydow Pine Needle Rust	jP	68% incidence with 10% foliar damage in a 4-ha plantation in Lane Township, Blind River District. In Firstbrook Township, Temagami District, 47% incidence occurred, with 6% foliar damage.
Chrysomyxa ledicola (Peck) Lagerh. Spruce Needle Rust	bS, wS	High incidence levels occurred at points in the Espanola, Sudbury and Wawa Districts. Defoliation levels varied from 5 to 50% and incidence levels from 75 to 100% on small clumps of trees not exceeding 2 ha in size.
Davisomycella ampla (J. Davis) Darker Tar Spot Needle Cast	jP	19% incidence with 6% foliar damage was reported on trees 1.9 m in height in a 20-ha plantation in Coleman Township, Temagami District.
Hypoxylon mammatum (Wahlenb.) J. Miller Hypoxylon Canker	tA	35% incidence occurred on trees 7 m in height in a 1-ha stand in Street Township, Sudbury District.
Lophomerium autumnale (Darker) Magasi Needle Cast	bF	A heavy (80%) infection was recorded on trees 1.0 m in height over 1 ha in Gillies Limit Twp, Temagami District.

(cont'd)

Table 14. Other forest diseases (concl.).

Disease	Host(s)	Remarks
Lophodermium nitens Darker Needle Cast	wP	Trace (2%) levels of fruiting bodies were found on lower branches of single trees in Lane Township, Blind River District.
Lophodermium sp. Needle Cast	rP	Trace levels of damage were observed on trees 1 to 3.5 m tall in Timbrell, Renwick and Villeneuve townships, Blind River District.
Pucciniastrum epilobii Otth Fir-fireweed Rust	bF	Small clumps of five to seven 6-m trees sustained 80% foliar damage in Peterson Township, Wawa District.
Septoria betulae Pass. Leaf Blight	wB	Widespread defoliation of 10 to 40% was recorded in the northern portion of Sudbury and Espanola districts. In a 10-ha area in Leinster Township, Sudbury District, 40% defoliation occurred on 90% of the trees.
Venturia macularis (Fr.) E. Müller & v. Arx. Shoot Blight	tA	Shoot blight caused approximately 25% foliar damage over several areas in Maness and Michano townships in Wawa District. Areas ranged from 1 to 25 ha. Trace levels were observed elsewhere in the Region.

ABIOTIC DAMAGE

Leaf Scorch

High temperatures and drying winds cause rapid loss of water, especially in exposed maple leaves. The leaf margins usually turn yellow then brown, and premature defoliation can occur. This condition was observed on sugar maple at several locations in the Sault Ste. Marie and Blind River districts. In Sault Ste. Marie District, damage was observed along Highway 556 from the Heyden area north to Bellevue along the Algoma Central Railway; the bulk of the damage occurred in Aweres Township and a small portion of the damage occurred in the southwestern corner of VanKoughnet Township. Foliar damage (discoloration) varied from 10% to approximately 75%. This condition also occurred along a short stretch (0.3 km) of roadside in the Tower Lake area of Meredith Township, with 75% of the foliage affected. Small pockets of approximately 1 ha were also observed in parts of Fisher Township, especially on hills and along ridge tops.

Similar damage also occurred at points in Blind River District. The most apparent damage (discoloration of foliage) occurred along Highway 555 from north of the town of Blind River to the Granary Lake area in Striker Township. Foliar damage varied from 10 to almost 100%. Damage was confined to small clumps (10 to 25 trees) and an occasional single tree. Similar damage occurred along Highway 17 just west of the town of Iron Bridge in Gladstone Township.

Maple Deterioration (Drought-related Damage)

Approximately 15,595 ha of drought-related damage occurred in parts of Aweres, Tarentorus, Jarvis and Duncan townships. The bulk of the damage was mapped in Jarvis and Duncan townships in the area east of Trout Lake in Sault Ste. Marie District. The most commonly affected host was sugar maple; however, damage was also apparent on white birch (*Betula papyrifera* Marsh.), yellow birch (*Betula alleghaniensis* Britton) and red maple (*Acer rubrum* L.).

Most of the damage observed was in the form of bare tops and discolored foliage. Mature and overmature trees were most commonly damaged. It was very difficult to determine if the bare tops of the larger trees were a result of premature defoliation caused by leaf scorch or were dead branches. All tops examined on smaller-diameter trees were still living, even though their foliage was sparse. This problem may perhaps be related to the drought conditions that prevailed in 1988 and 1989, with symptoms only beginning to appear now.

Aerial surveys will be conducted in this area in 1991 to determine if leaf flushing occurs and if the deterioration continues.

Salt Damage

Although this condition was observed in many areas of the Region, it was most noticeable in several areas of the Sault Ste. Marie and Blind River districts. Heavy salt damage occurred on mature eastern white pine and red pine in Sault Ste. Marie District along Highway 17 from the Garden River Indian Reserve to the town of Echo Bay. Average foliar damage of 50% was recorded on these 40-cm-DBH trees. As a result of repeated heavy salting of the highway, mortality is occurring, particularly to roadside eastern white pine in this area. In Blind River District, foliar damage of between 30 and 50% occurred on semimature red pine east of Iron Bridge on Highway 17, particularly in Bright and Thompson townships.

Snow Damage

In November of 1989, an early snowstorm deposited 0.9 m of snow over a large area in the western portion of Wawa District, extending into Gourlay Township of Hearst District (Fig. 7). Most of the damage occurred within a 222,650-ha area of forested land in the Domtar timber limits.

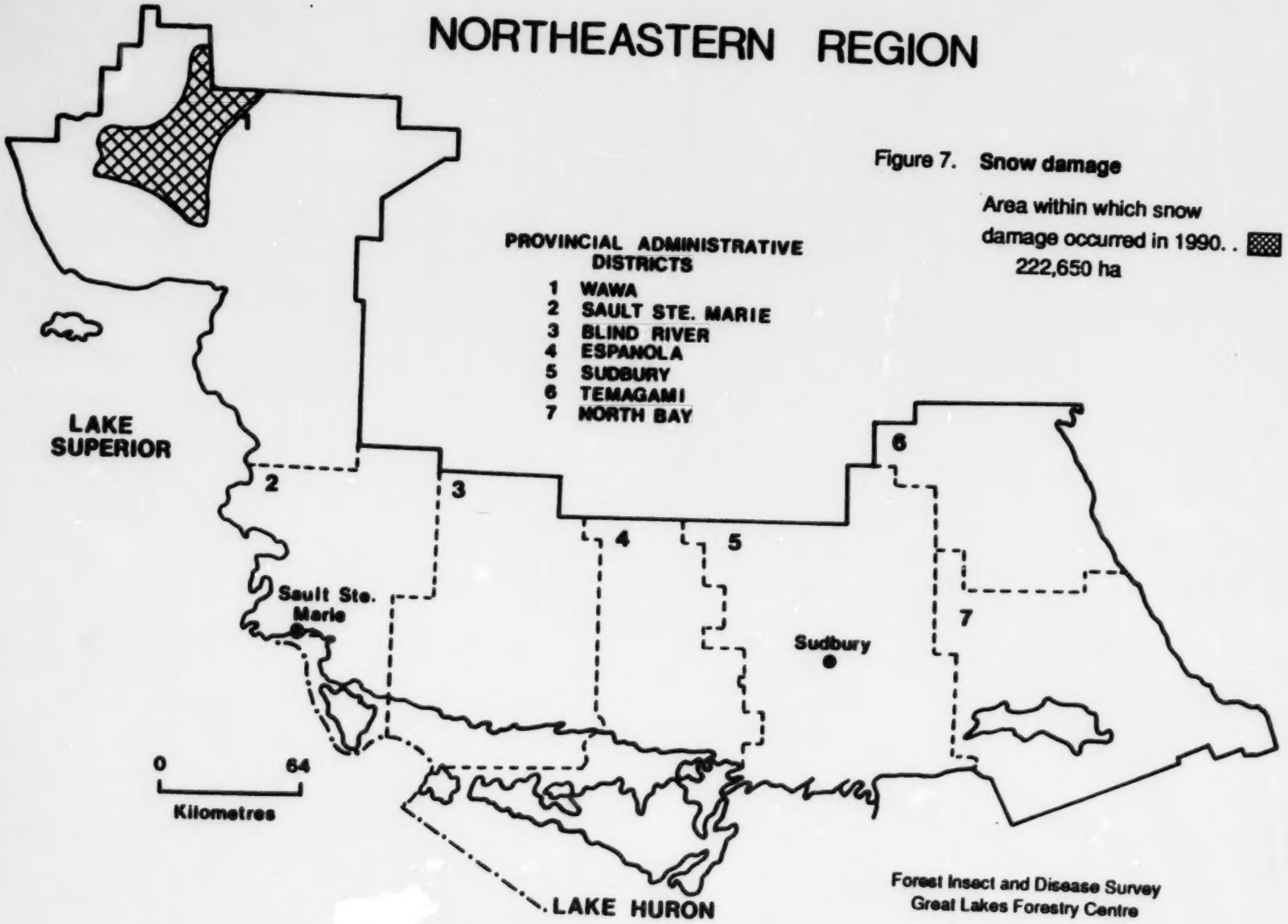

Figure 7. **Snow damage**

Area within which snow damage occurred in 1990. . 222,650 ha

The most severe damage occurred in the Muddy Lake Block, with the bulk of the damage occurring on jack pine. Damage was mostly in the form of broken tops and was most noticeable in overstocked stands. In all, 48 stands were examined and damage ranged from 1 to 50%, with an overall average of 15.03%. This information and aerial mapping data were provided by Domtar Forest Products of White River.

Winter Drying

This condition was reported in several districts of the Region. In Blind River District, heavy damage was found at three locations. In Parkinson Township, 85% incidence was reported, with 38% foliar damage on 2.3-m pitch pine (*Pinus rigida* Mill.) in a 0.5-ha area. Incidence levels of 74% were recorded for a 2-ha site of 1.5-m red pine in Timbrell Township, with 7% foliar damage. In Bouck Township, 59% of the 1.7-m red pine were affected, with 21% foliar damage over a 4-ha area. In Gordon Township, Espanola District, 90% incidence occurred on 1.5-m open-grown eastern white pine in a 1-ha area. Foliar damage was approximately 40%.

FOREST HEALTH

Acid Rain National Early Warning System (ARNEWS)

The four ARNEWS study plots established in 1984 and 1985 in the North Bay, Sault Ste. Marie, Sudbury and Wawa districts were tallied again in 1990.

In Wishart Township, Sault Ste. Marie District, no major insect defoliators were observed in the ARNEWS plot; however, trace (2%) levels of leaf scorch occurred on several trees. At the plot in Huotari Township, Wawa District, 24% wind damage to the jack pine trees occurred. Damage was in the form of broken tops and lateral branches in the upper crowns of trees. Squirrel damage (flagging) was also observed on 12% of the trees at the site.

Approximately 50% defoliation by the forest tent caterpillar was recorded at the Agnew Lake plot in Hyman Township, Sudbury District. No major defoliators were observed in the plot at Calvin Township (Samuel de Champlain Provincial Park) in North Bay District. However, the bronze birch borer (*Agrilus anxius* Gory) was found damaging three of the 18 white birch in the plot. Much lower branch mortality was also observed on trembling aspen at this location.

No major disease-causing organisms were found in the above plots, and no acid rain symptoms were observed.

Birch Health

Some 43,935 ha of birch top mortality were aerially mapped in 1989 in parts of the Sault Ste. Marie, Sudbury and Wawa districts. No special surveys were conducted in 1990, although the problem still exists. However,

soil pits were dug at several locations within a plot established in Bailloquet Township, Wawa District, during the second week of July by staff of the Ontario Ministry of the Environment. The plot established in 1989 in Bailloquet Township was re-tallied in 1990. No major changes were observed in the extent of crown dieback (Table 15).

Table 15. Birch dieback for 1989 and 1990 in the Northeastern Region of Ontario (data based on an examination of 100 host trees).

Location (Twp)	Year	Current dieback[a]						Cumulative dieback[a]					
		0	1	2	3	4	5	0	1	2	3	4	5
		No. of trees											
Wawa District													
Bailloquet[b]	1989	72	26	0	0	0	2	30	39	17	4	8	2
	1990	62	34	0	0	1	3	34	34	19	2	8	3

[a] dieback classification: 0 = 0-5%, 1 = 6-20%, 2 = 21-40%, 3 = 41-60%, 4 = >61%, 5 = dead

[b] Trees averaged 24.3 cm in DBH and 20.5 m in height.

Maple Health

Since 1987, 42 plots have been established in the Region (Fig. 8) to determine the amount of crown dieback and the change in dieback over time. Each plot consists of 25 mature or overmature maple selected along a 3-m-wide strip on a random azimuth. Trees were permanently numbered, height and diameters were measured, and damage by insects, diseases and animals, as well as by abiotic conditions such as frost, were recorded.

In 1989, the most commonly encountered insect was the forest tent caterpillar, which caused from 2 to 50% defoliation in 29% of the plots examined. Eutypella canker (*Eutypella parasitica* Davidson & Lorenz.) was the most damaging disease encountered, and 3 to 9% of the trees were cankered. However, very little mortality has occurred and mortality is presently less than 1%. Current dieback is summarized in Table 16 from 1987 to 1990.

North American Maple Project

The North American Maple Project is a cooperative agreement between the United States Forest Service and Forestry Canada. In 1988, 24 plots consisting of five 20- x 20-m subplots were established at preselected sites throughout the province. Four plots were placed in Northeastern Region, two each in sugar bushes and undisturbed woodlots. In all, 62 plots were placed across Ontario, New Brunswick, Nova Scotia and Quebec, and 103 sites were selected across seven states in the United States. Results of dieback surveys over the past 3 years are summarized in Table 17.

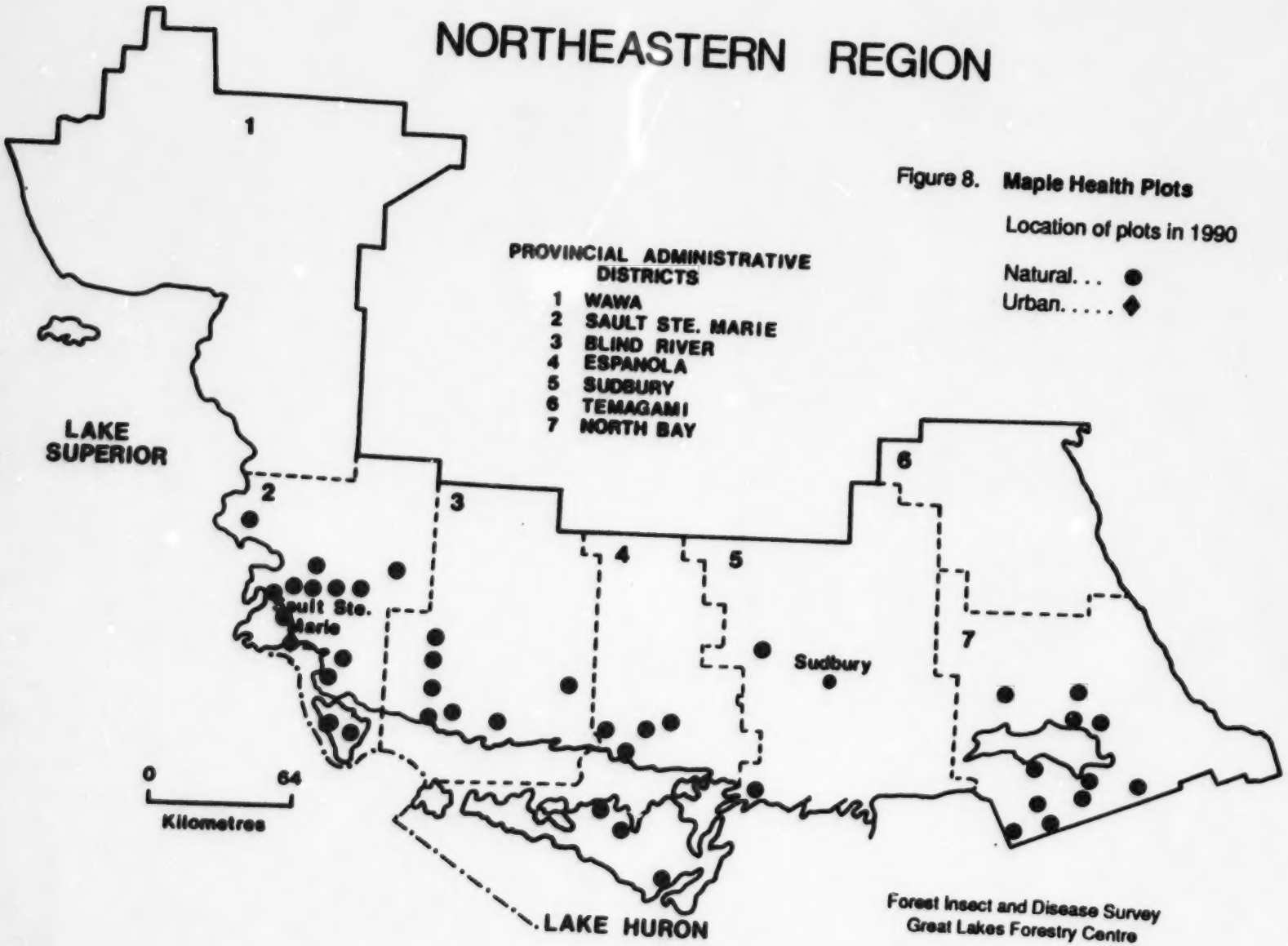

Figure 8. **Maple Health Plots**

Location of plots in 1990

Table 16. Sugar maple health in the Northeastern Region of Ontario from 1987 to 1990 (25 maples were examined at each of 42 plots).

Location (Twp)	Avg. DBH (cm)	Avg. ht. (m)	Year	Current dieback[a] 0	1	2	3	4	5	Cumulative dieback[a] 0	1	2	3	4	5
				No. of trees											
Blind River District															
Casson	23.2	18.0	1988	25	0	0	0	0	0	24	1	0	0	0	0
			1989	24	1	0	0	0	0	22	2	1	0	0	0
			1990	24	1	0	0	0	0	24	0	1	0	0	0
Gladstone	30.6	22.8	1987	25	0	0	0	0	0	25	0	0	0	0	0
			1988	25	0	0	0	0	0	21	3	1	0	0	0
			1989	25	0	0	0	0	0	23	2	0	0	0	0
			1990	25	0	0	0	0	0	24	1	0	0	0	0
Gould	24.9	21.2	1988	25	0	0	0	0	0	18	7	0	0	0	0
			1989	25	0	0	0	0	0	18	7	0	0	0	0
			1990	24	1	0	0	0	0	21	4	0	0	0	0
Gunterman	23.2	20.8	1988	24	1	0	0	0	0	22	2	1	0	0	0
			1989	24	1	0	0	0	0	23	1	1	0	0	0
			1990	25	0	0	0	0	0	23	2	0	0	0	0
Scarfe	18.4	18.8	1988	25	0	0	0	0	0	24	1	0	0	0	0
			1989	25	0	0	0	0	0	22	3	0	0	0	0
			1990	25	0	0	0	0	0	23	2	0	0	0	0
Thessalon	22.0	20.7	1987	25	0	0	0	0	0	25	0	0	0	0	0
			1988	25	0	0	0	0	0	22	3	0	0	0	0
			1989	25	0	0	0	0	0	22	3	0	0	0	0
			1990	25	0	0	0	0	0	23	2	0	0	0	0
Wells	24.5	21.7	1987	24	0	0	1	0	0	24	0	0	1	0	0
			1988	24	1	0	0	0	0	22	2	1	0	0	0
			1989	24	0	1	0	0	0	20	4	1	0	0	0
			1990	25	0	0	0	0	0	22	3	0	0	0	0
Espanola District															
Allan	28.0	20.8	1989	17	8	0	0	0	0	8	12	4	1	0	0
			1990	17	8	0	0	0	0	6	13	5	1	0	0
Billings	18.5	15.4	1987	25	0	0	0	0	0	24	1	0	0	0	0
			1988	25	0	0	0	0	0	22	3	0	0	0	0
			1989	20	5	0	0	0	0	16	8	1	0	0	0
			1990	21	4	0	0	0	0	16	8	1	0	0	0
Gough	23.3	16.1	1987	25	0	0	0	0	0	24	1	0	0	0	0
			1988	22	3	0	0	0	0	21	4	0	0	0	0
			1989	18	7	0	0	0	0	8	15	2	0	0	0
			1990	20	5	0	0	0	0	6	17	2	0	0	0
Shakespeare	28.1	18.0	1989	23	2	0	0	0	0	14	11	0	0	0	0
			1990	18	7	0	0	0	0	13	12	0	0	0	0
Shedden	33.3	20.7	1989	16	8	1	0	0	0	3	12	8	2	0	0
			1990	16	8	0	0	0	1	3	11	9	1	0	1

(cont'd)

Table 16. Sugar maple health in the Northeastern Region of Ontario from 1987 to 1990 (25 maples were examined at each of 42 plots) (cont'd).

Location (Twp)	Avg. DBH (cm)	Avg. ht. (m)	Year	Current dieback[a] 0	1	2	3	4	5	Cumulative dieback[a] 0	1	2	3	4	5
				No. of trees											
Espanola District (concl.)															
Spanish River Indian Reserve	21.4	16.2	1987	25	0	0	0	0	0	25	0	0	0	0	0
			1988	23	2	0	0	0	0	23	2	0	0	0	0
			1989	23	2	0	0	0	0	20	5	0	0	0	0
			1990	25	0	0	0	0	0	21	4	0	0	0	0
Tehkummah	28.6	16.2	1989	20	5	0	0	0	0	13	10	1	1	0	0
			1990	19	7	0	0	0	0	12	11	1	1	0	0
North Bay District															
Blyth	18.4	13.9	1987	21	4	0	0	0	0	17	2	3	3	0	0
			1988	15	10	0	0	0	0	14	5	4	2	0	0
			1989	20	3	1	0	1	0	15	7	2	0	1	0
			1990	16	7	0	0	1	1	10	11	2	0	1	1
Chisholm	23.7	17.6	1989	25	0	0	0	0	0	25	0	0	0	0	0
			1990	24	1	0	0	0	0	24	1	0	0	0	0
Commanda	22.8	16.0	1989	23	2	0	0	0	0	18	7	0	0	0	0
			1990	25	0	0	0	0	0	16	9	0	0	0	0
East Mills	21.2	15.0	1989	17	8	0	0	0	0	9	13	3	0	0	0
			1990	14	11	0	0	0	0	6	11	7	1	0	0
French	16.3	13.9	1987	22	3	0	0	0	0	19	6	0	0	0	0
			1988	23	2	0	0	0	0	13	6	5	1	0	0
			1989	17	7	1	0	0	0	12	8	3	2	0	0
			1990	18	7	0	0	0	0	11	10	1	3	0	0
Nipissing	22.0	16.1	1987	25	0	0	0	0	0	23	2	0	0	0	0
			1988	13	2	0	0	0	0	21	4	0	0	0	0
			1989	18	7	0	0	0	0	11	12	1	0	1	0
			1990	20	5	0	0	0	0	11	10	2	1	1	0
Nipissing	20.6	16.6	1989	24	1	0	0	0	0	17	9	0	0	0	0
			1990	22	3	0	0	0	0	16	9	0	0	0	0
Patterson	18.3	16.0	1987	25	0	0	0	0	0	20	4	0	1	0	0
			1988	21	4	0	0	0	0	20	4	1	0	0	0
			1989	22	3	0	0	0	0	13	11	1	0	0	0
			1990	23	1	1	0	0	0	11	11	1	0	2	0
Pringle	22.5	15.6	1989	24	1	0	0	0	0	19	6	0	0	0	0
			1990	22	3	0	0	0	0	18	7	0	0	0	0
Pringle	22.3	15.7	1987	25	0	0	0	0	0	21	4	0	0	0	0
			1988	20	5	0	0	0	0	16	9	0	0	0	0
			1989	23	1	1	0	0	0	14	10	0	1	0	0
			1990	23	2	0	0	0	0	14	10	0	1	0	0
Widdifield	31.1	18.6	1989	16	9	0	0	0	0	7	14	4	0	0	0
			1990	19	6	0	0	0	0	7	13	5	0	0	0

(cont'd)

Table 16. Sugar maple health in the Northeastern Region of Ontario from 1987 to 1990 (25 maples were examined at each of 42 plots) (cont'd).

Location (Twp)	Avg. DBH (cm)	Avg. ht. (m)	Year	Current dieback[a] (No. of trees)						Cumulative dieback[a] (No. of trees)					
				0	1	2	3	4	5	0	1	2	3	4	5
Sault Ste. Marie District															
Aweres	27.3	20.9	1987	18	7	0	0	0	0	18	7	0	0	0	0
			1988	21	4	0	0	0	0	12	12	1	0	0	0
			1989	24	1	0	0	0	0	9	16	0	0	0	0
			1990	22	3	0	0	0	0	11	14	0	0	0	0
Deroche	18.4	22.0	1987	20	5	0	0	0	0	20	5	0	0	0	0
			1988	25	0	0	0	0	0	17	7	1	0	0	0
			1989	25	0	0	0	0	0	21	3	1	0	0	0
			1990	25	0	0	0	0	0	24	1	0	0	0	0
Fenwick	23.1	21.3	1987	21	4	0	0	0	0	21	4	0	0	0	0
			1988	25	0	0	0	0	0	22	3	0	0	0	0
			1989	22	3	0	0	0	0	13	10	2	0	0	0
			1990	24	1	0	0	0	0	21	3	1	0	0	0
Hilton	23.0	22.0	1987	18	7	0	0	0	0	18	7	0	0	0	0
			1988	21	4	0	0	0	0	19	6	0	0	0	0
			1989	22	3	0	0	0	0	22	3	0	0	0	0
			1990	24	1	0	0	0	0	24	1	0	0	0	0
Hodgins	24.5	22.2	1987	18	0	3	4	0	0	18	0	3	4	0	0
			1988	20	4	1	0	0	0	15	6	2	2	0	0
			1989	17	6	2	0	0	0	13	8	3	1	0	0
			1990	20	4	0	0	0	1	18	5	1	0	0	1
Jocelyn	33.5	23.0	1988	24	1	0	0	0	0	22	2	1	0	0	0
			1989	24	1	0	0	0	0	22	3	0	0	0	0
			1990	24	1	0	0	0	0	17	8	0	0	0	0
Jollineau	25.8	19.7	1988	23	2	0	0	0	0	13	10	1	1	0	0
			1989	20	4	1	0	0	0	13	7	4	1	0	0
			1990	20	4	1	0	0	0	13	9	2	1	0	0
Laird	23.9	21.3	1987	24	1	0	0	0	0	24	1	0	0	0	0
			1988	22	3	0	0	0	0	14	5	5	1	0	0
			1989	25	0	0	0	0	0	16	9	0	0	0	0
			1990	25	0	0	0	0	0	14	10	0	1	0	0
Meredith	35.0	20.3	1987	15	0	5	4	0	1	15	0	5	4	0	1
			1988	24	0	0	0	0	1	13	5	5	1	0	1
			1989	22	2	0	0	0	1	14	7	3	0	0	1
			1990	21	3	0	0	0	1	16	6	2	0	0	1
Palmer	32.0	21.3	1988	24	1	0	0	0	0	17	7	1	0	0	0
			1989	25	0	0	0	0	0	20	5	0	0	0	0
			1990	25	0	0	0	0	0	20	5	0	0	0	0
Shield	26.0	21.4	1988	22	2	1	0	0	0	15	6	3	1	0	0
			1989	25	0	0	0	0	0	20	5	0	0	0	0
			1990	24	1	0	0	0	0	19	5	0	0	0	1

(cont'd)

Table 16. Sugar maple health in the Northeastern Region of Ontario from 1987 to 1990 (25 maples were examined at each of 42 plots) (concl.).

Location (Twp)	Avg. DBH (cm)	Avg. ht. (m)	Year	Current dieback[a]						Cumulative dieback[a]					
				0	1	2	3	4	5	0	1	2	3	4	5
				No. of trees											
Sault Ste. Marie District (concl.)															
Tarentorus[b] (Sault Ste. Marie)	48.5	19.4	1989	15	5	0	0	0	0	9	5	2	0	4	0
			1990	14	5	1	0	0	0	8	7	1	0	4	0
Vankoughnet	20.8	20.1	1988	25	0	0	0	0	0	21	4	0	0	0	0
			1989	24	0	0	0	0	1	23	1	0	0	0	1
			1990	23	1	0	0	0	1	23	0	1	0	0	1
Whitman	26.5	21.0	1988	23	1	1	0	0	0	16	7	1	1	0	0
			1989	20	3	1	1	0	0	14	9	0	2	0	0
			1990	23	1	0	0	0	1	18	5	0	1	0	1
Sudbury District															
Cascaden	16.9	12.9	1987	24	1	0	0	0	0	20	5	0	0	0	0
			1988	22	3	0	0	0	0	22	3	0	0	0	0
			1989	19	6	0	0	0	0	12	8	3	0	0	1
			1990	19	5	0	0	0	1	10	10	4	0	0	1
Killarney	21.0	14.6	1987	24	1	0	0	0	0	20	1	0	1	0	0
			1988	24	1	0	0	0	0	23	1	0	1	0	0
			1989	23	2	0	0	0	0	18	6	1	0	0	0
			1990	21	4	0	0	0	0	16	8	1	0	0	0

[a] dieback classification: 0 = 0-5%, 1 = 6-20%, 2 = 21-40%, 3 = 41-60%, 4 = >61%, 5 = dead tree. No trees had been blown down or cut in any of the plots.

[b] 20-tree urban plot

Forest tent caterpillar defoliation was not recorded in any of the plots in 1990. Armillaria root rot was the only major disease observed to be causing significant damage. At the Patterson Township plot in North Bay District, 83% of the white birch were killed by this disease. Other tree species in the plot were not affected.

Single-tree Mortality

This condition was again prevalent in several areas of the Region, affecting white spruce and balsam fir, especially in forests formerly damaged by the spruce budworm. As reported in 1989, the problem of single-tree mortality was prevalent in Lake Superior Provincial Park, throughout Asselin, Brimacombe, Giles, Goodwillie, Tiernan and Paterson townships of Wawa District. Mortality was confined to mature and overmature balsam fir and white spruce trees. Although no samples were submitted in 1990, sampling in 1989

Table 17. Crown condition of sugar maple at four North American Maple Project plots from 1988 to 1990 in the Northeastern Region of Ontario.

Location (Twp)	Avg. DBH (cm)	Year	No. of trees examined	Total percentage of dead crown: 0	1-5	6-15	16-25	26-35	36-45	46-55	56-65	66-75	76-100	Trees dead	Trees blown down or cut
				Number of trees											
North Bay District															
Wipissing[b]	19.6	1988	113	56	39	13	3	1	1	0	0	0	0	0	0
		1989	113	20	69	16	6	2	0	0	0	0	0	0	0
		1990	113	0	102	7	2	1	1	0	0	0	0	0	0
Patterson[a]	19.6	1988	65	23	29	7	5	0	0	0	1	0	0	0	0
		1989	65	22	23	16	3	0	0	0	0	1	0	0	0
		1990	64	0	62	2	0	0	0	0	0	0	0	1	0
Sault Ste. Marie District															
Wishart[a]	27.6	1988	74	27	21	10	11	4	0	0	0	1	0	0	0
		1989	72	19	31	14	4	3	0	0	1	0	0	1	1
		1990	72	0	49	12	5	5	0	0	1	0	0	1	1
Tarentorus[b]	24.4	1988	84	8	57	16	2	1	0	0	0	0	0	0	0
		1989	82	3	31	27	19	0	0	1	0	0	0	0	2
		1990	80	0	62	11	6	1	0	0	0	0	0	2	2

[a] undisturbed woodlot

[b] trees currently tapped for maple syrup

revealed the presence of Armillaria root rot, the balsam fir spruce beetle (*Dendroctonus rufipennis* [Kby.]), and sawyer beetles (*Monochamus* spp.), all of which are suspected factors associated with this mortality.

Mortality, mainly of balsam fir, was also observed in several townships of Sault Ste. Marie District. In areas west of the city of Sault Ste. Marie, dead trees were detected from aerial surveys in Prince, Denis and Pennefather townships. Similar damage also occurred at many points along the Ranger Lake Road and along Highway 129 from Casson Township north to the Chapleau District boundary.

Again, mortality seems to appear in areas previously defoliated by spruce budworm over a period of several years.

SPECIAL SURVEYS

Seed Orchard Survey

A special survey was conducted in 1990 at the request of the OMNR in Northeastern Region to develop an inventory of disease and insect problems in seed orchards. Two jack pine seed orchards were surveyed, one in Hallam Township, Espanola District, and the other in Lumsden Township, Sudbury District. A single eastern white pine seed orchard was surveyed in Mattawan Township, North Bay District. Because the request was made late in the summer, the early-season evaluation was not completed and only the status of late-season pests is available for this report. In 1991, however, both early- and late-season pests will be surveyed.

The insects and diseases surveyed and the results for the jack pine seed orchards are summarized in Table 18. The organism that caused the most damage was the eastern pine shoot borer, which killed 12% of the leaders in Hallam Township and 8.7% in Lumsden Township.

No insect or disease damage was recorded during the late-season survey of the eastern white pine seed orchard in Mattawan Township. However, overpruning of the 0.9-m grafted trees has caused considerable damage and mortality. Competition from fast-growing deciduous trees is another problem in this orchard.

Thessalon Tree Nursery

No major insect or disease problems were encountered during routine visits to the nursery. Some minor problems were present, but no serious losses of nursery stock occurred.

Damage samples were submitted and were identified by the Forest Insect and Disease Survey Unit from samples collected by FIDS and Forest Health and Protection Section (FHAPS) staff. Problems identified as causing trace levels of damage were grasshopper (Acrididae) nymphs causing some leaf curling on red oak seedlings, rodent damage in Compartment 3 on white pine (which were chewed off at the root collar), along with the white pine aphid (*Cinara strobi* [Fitch]) and spider mites (*Oligonychus ununguis* [Jac.]).

"Rising" 3-0 white pine samples suspected of hosting Cylindrocladium root rot (*Cylindrocladium floridanum* Sob. & C.P. Seym.) were submitted; however, no evidence of this disease was found on the roots or in the soil submitted. A needle cast (*Lophodermium pinastri* [Schrader : Fr.] Chev.), a common needle inhabitant in nurseries, was also present on the rising 3-0 white pine samples; however, very few needles were infected. Both *Cylindrocarpon* sp. and *Fusarium* sp., which are commonly isolated from dead roots, were also found on the seedlings; however, the literature suggests that these organisms are saprophytes that may become weak parasites.

Table 18. Damage in two jack pine seed orchards in the Northeastern Region of Ontario in 1990 (results based on an examination of 150 randomly selected trees at each location).

	Espanola[a]	Sudbury[a]
	Hallam Township	Lumsden Township
Avg. ht. (m)	2.3	2.1
Area (ha)	25	10
Trees/ha	2,400	2,500
Jack Pine Budworm		
Trees affected (%)	0	0
Jack Pine Sawflies		
Trees affected (%)	0	0
White Pine Weevil		
Leaders affected (%)	0.7	8.0
Pine Shoot Borer		
Laterals affected (%)	16.7	14.7
Leaders affected (%)	12.0	8.7
Jack Pine Tip Beetle		
Leaders affected	0	1.3
Swaine Sawfly		
Trees affected (%)	0	0
Pine Spittlebug		
Trees affected (%)	NA	NA
Needle Rust		
Trees affected (%)	NA	NA
Needle Cast		
Trees affected (%)	NA	NA
Armillaria Root Rot		
Trees affected (%)	0.7	0.7
Scleroderris Canker		
Trees affected (%)	0	0
Western Gall Rust		
Trees affected (%)	0	0
Stem Rust		
Trees affected (%)	0	0

[a] NA = not available

In areas adjacent to and on the perimeter of the nursery, single colonies of the European pine sawfly were observed on Scots pine; however, only trace feeding occurred. Other insects encountered at trace levels were the white pine weevil, the eastern pine shoot borer, the jack pine tip beetle and the European spruce sawfly.

Mechanical and chemical damage were also observed at scattered points throughout the nursery, but damage was very light.

Climatic Data

Environmental factors such as temperature and precipitation play an important role in the development of insects and diseases and in tree growth in the forest. Certain weather conditions can predispose the forest to damage, and can be the cause of marked fluctuations in insect populations or in the incidence of disease. Adverse weather conditions cause abiotic damage such as frost, winter drying or scorch, breakage as a result of wind, snow or hail damage, and drought. Weather data for three locations across the Region are recorded in Table 19. This table includes the monthly mean temperature, total precipitation for 1990 and the deviation of both parameters from 30-year normals. More detailed weather information can be obtained from local Atmospheric Environment Service weather offices.

Table 19. Mean temperatures and total precipitation at three locations in the Northeastern Region of Ontario in 1990.

Location	Month	Mean temperature (°C) Normal	Mean temperature (°C) Actual	Deviation from normal (°C)	Total precipitation (mm) Normal	Total precipitation (mm) Actual	Deviation from normal (mm)
Sault Ste. Marie Airport	January	-10.1	-5.0	+5.1	74.0	64.5	-9.5
	February	-10.0	-8.8	+1.2	68.0	52.3	-15.7
	March	-5.1	-3.8	+1.3	60.4	59.7	-0.7
	April	3.1	4.4	+1.3	64.4	58.1	-6.3
	May	9.1	8.7	-0.4	84.2	81.3	-2.9
	June	14.6	13.6	-1.0	74.3	116.2	+41.9
	July	17.3	17.0	-0.3	55.6	45.6	-10.0
	August	16.9	16.9	+0.0	82.7	59.0	-23.7
	September	12.8	12.6	-0.2	95.3	119.6	+24.3
	October	7.6	6.1	-1.5	74.2	98.2	+24.0
	November	0.7	2.3	+1.6	85.7	97.2	+11.5
	December	-6.7	-5.5	+1.2	79.6	68.5	-11.1
Sudbury Airport	January	-13.7	-7.6	+6.1	57.5	82.1	+24.6
	February	-12.5	-10.8	+1.7	47.0	35.0	-12.0
	March	-6.0	-4.2	+1.8	55.2	31.8	-23.4
	April	2.7	4.9	+2.2	61.1	49.1	-12.0
	May	10.5	9.7	-0.8	67.1	142.7	+75.6
	June	16.0	15.6	-0.4	82.8	145.6	+62.8
	July	18.7	18.8	+0.1	83.1	38.2	-44.9
	August	17.3	18.2	+0.9	82.9	40.8	-42.1
	September	12.2	11.6	-0.6	106.5	72.7	-33.8
	October	6.3	9.8	+3.5	74.6	144.2	+69.6
	November	-1.2	-0.2	+1.0	77.8	120.5	+42.7
	December	-10.2	-7.9	+2.3	65.8	54.4	-11.4
North Bay Airport	January	-13.0	-7.0	+6.0	63.5	99.9	+36.4
	February	-11.3	-10.3	+1.0	56.2	31.4	-24.8
	March	-5.3	-3.3	+2.0	61.1	34.0	-27.1
	April	3.2	4.9	+1.7	62.3	48.0	-14.3
	May	10.6	9.8	+0.8	69.3	160.8	+75.7
	June	15.7	15.6	-0.1	85.1	157.4	+72.3
	July	18.3	18.5	+0.2	102.4	127.2	+24.8
	August	17.0	18.2	+1.2	98.7	41.4	-57.3
	September	12.2	11.3	-0.9	115.9	147.6	+31.7
	October	6.4	5.7	-0.7	87.7	131.7	+44.0
	November	-1.0	-0.1	+0.9	86.6	154.8	+68.2
	December	-9.7	-17.8	-8.1	75.4	65.5	-9.9